E = INTERNAL ENERGY, B. T. U., ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR–N_2 AT 100°F

Q_v = INT. ENERGY OF COMBUSTION, AT 100°F., OF UNBURNED FUEL IN THE EQUILIBRIUM MIXTURE AT T. WHEN T ≤ 2880°R., Q_v = 1.5, 2.0, 3.0, AT S = 0.4, 0.6, 0.8, RESPECTIVELY

$E_s = E - Q_v$

H = ENTHALPY, $E + J(PV)$

$H_s = E_s + J(PV)$ [· $H = H_s + Q_v$]

P = PRESSURE, LBS./SQ. IN. (DASHED LINES)

V = VOLUME, CU. FT. (SOLID LINES)

S = ENTROPY, ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR–N_2, EACH AT ONE ATMOSPHERE, 100°F

T = TEMPERATURE, °R = (°F + 460)

FUEL = $(CH_2)_x$

APPROXIMATE SCALE FOR HORIZONTAL INTERPOLATION BETWEEN PRESSURE OR VOLUME LINES

H – INTERPOLATION SCALE

INTERNAL ENERGY, 100'S B.T.U.

$\frac{H_s}{100}$ $\frac{E_s}{100}$ $\frac{E}{100}$

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

DASHED LINES, PRESSURE

IN THIS RANGE,	
S	Q_v
0.3	1.0
0.4	1.5
0.5	1.5
0.6	2.0
0.7	2.5
0.8	3.0

F = 0.9
PRODUCTS OF COMBUSTION OF 1 LB. OF AIR WITH 90% OF THEORETICAL FUEL, IN CHEMICAL EQUILIBRIUM 0.06098 LBS. FUEL/LB. AIR

ALL VALUES OF EXTENSIVE VARIABLES TAKEN FROM THIS CHART ARE ON A MASS BASIS AND THEREFORE ARE REFERRED TO IN THE TEXT BY LOWER-CASE SYMBOLS.

ENTROPY, B.T.U. PER DEGREE R.

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M.I.T., CAMBRIDGE MASS.

E = INTERNAL ENERGY, B. T. U., ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR – N_2 AT 100°F

Q_v = INT. ENERGY OF COMBUSTION, AT 100°F., OF UNBURNED FUEL IN THE EQUILIBRIUM MIXTURE AT T. WHEN $T \leq 2880°R.$, $Q_v = 2.0, 2.5, 4.0$, AT $S = 0.4, 0.6, 0.8$, RESPECTIVELY

$E_s = E - Q_v$

H = ENTHALPY, $E + J(PV)$

$H_s = E_s + J(PV)$ $[\therefore H = H_s + Q_v]$

P = PRESSURE, LBS./SQ. IN. (DASHED LINES)

V = VOLUME, CU. FT. (SOLID LINES)

S = ENTROPY, ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR – N_2, EACH AT ONE ATMOSPHERE, 100°F

T = TEMPERATURE, °R = (°F + 460)

FUEL = $(CH_2)_x$

APPROXIMATE SCALE FOR HORIZONTAL INTERPOLATION BETWEEN PRESSURE OR VOLUME LINES

H - INTERPOLATION SCALE

INTERNAL ENERGY, 100'S B.T.U.

$\frac{H_s}{100}$ $\frac{E}{100}$

$\frac{E_s}{100}$

ENTROPY, B.T.U. PER DEGREE R.

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

DASHED LINES, PRESSURE

ALL VALUES OF EXTENSIVE VARIABLES TAKEN FROM THIS CHART ARE ON A MASS BASIS AND THEREFORE ARE REFERRED TO IN THE TEXT BY LOWER-CASE SYMBOLS.

F = 0.8
PRODUCTS OF COMBUSTION OF 1 LB. OF AIR WITH 80% OF THEORETICAL FUEL, IN CHEMICAL EQUILIBRIUM
0.05420 LBS. FUEL/LB. AIR

IN THIS RANGE,

S	Q_v
0.3	1.5
0.4	2.0
0.5	2.0
0.6	2.5
0.7	3.0
0.8	4.0

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M. I. T., CAMBRIDGE, MASS.

E = INTERNAL ENERGY, B.T.U., ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR – N_2 AT 100°F

Q_v = INT. ENERGY OF COMBUSTION, AT 100°F, OF UNBURNED FUEL IN THE EQUILIBRIUM MIXTURE AT T. WHEN T ≤ 2880°R., Q_v = 1, 2, 5, AT S = 0.4, 0.6, 0.8, RESPECTIVELY

$E_s = E - Q_v$

H = ENTHALPY, $E + J(PV)$

$H_s = E_s + J(PV)$ [$\therefore H = H_s + Q_v$]

P = PRESSURE, LBS./SQ. IN. (DASHED LINES)

V = VOLUME, CU. FT. (SOLID LINES)

S = ENTROPY, ABOVE CO_2, H_2O (VAPOR) O_2, AND AIR – N_2, EACH AT ONE ATMOSPHERE, 100°F.

T = TEMPERATURE, °R = (°F + 460)

FUEL = $(CH_2)_x$

APPROXIMATE SCALE FOR HORIZONTAL INTERPOLATION BETWEEN PRESSURE OR VOLUME LINES

H - INTERPOLATION SCALE

INTERNAL ENERGY, 100'S B.T.U.

$\frac{H_s}{100}$ $\frac{E}{100}$

$\frac{E_s}{100}$

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

DASHED LINES, PRESSURE

IN THIS RANGE,	
S	Q_v
0.3	0.5
0.4	1.0
0.5	1.5
0.6	2.0
0.7	3.0
0.8	5.0

ALL VALUES OF EXTENSIVE VARIABLES TAKEN FROM THIS CHART ARE ON A MASS BASIS AND THEREFORE ARE REFERRED TO IN THE TEXT BY LOWER-CASE SYMBOLS.

F = 1.0
PRODUCTS OF COMBUSTION OF 1 LB. OF AIR WITH THE THEORETICAL FUEL, IN CHEMICAL EQUILIBRIUM
0.06775 LBS. FUEL/LB. AIR

ENTROPY, B.T.U. PER DEGREE R.

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M.I.T., CAMBRIDGE, MASS.

E = INTERNAL ENERGY, B.T.U., ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR – N_2 AT 100°F.

Q_v = INT. ENERGY OF COMBUSTION, AT 100°F., OF UNBURNED FUEL IN THE EQUILIBRIUM MIXTURE AT T. WHEN T ≤ 2880°R., Q_v = 169.

$E_s = E - Q_v$

H = ENTHALPY, $E + J(PV)$

$H_s = E_s + J(PV)$ [$\therefore H = H_s + Q_v$]

P = PRESSURE, LBS./SQ. IN. (DASHED LINES)

V = VOLUME, CU. FT. (SOLID LINES)

S = ENTROPY, ABOVE CO_2, H_2O (VAPOR) O_2, AND AIR – N_2, EACH AT ONE ATMOSPHERE, 100°F.

T = TEMPERATURE, °R = (°F + 460)

FUEL = $(CH_2)_x$

APPROXIMATE SCALE FOR HORIZONTAL INTERPOLATION BETWEEN PRESSURE OR VOLUME LINES

H – INTERPOLATION SCALE

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

ALL VALUES OF EXTENSIVE VARIABLES TAKEN FROM THIS CHART ARE ON A MASS BASIS AND THEREFORE ARE REFERRED TO IN THE TEXT BY LOWER-CASE SYMBOLS.

F = 1.1
PRODUCTS OF COMBUSTION OF 1 LB. OF AIR WITH 110% OF THEORETICAL FUEL, IN CHEMICAL EQUILIBRIUM 0.07453 LBS. FUEL/LB. AIR

$\frac{H_s}{100}$ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

$\frac{E}{100}$ 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

INTERNAL ENERGY, 100'S B.T.U.

IN THIS RANGE $E - E_s = Q_v = 169$

0.32 0.34 0.36 0.38 0.40 0.42 0.44 0.46 0.48 0.50 0.52 0.54 0.56 0.58 0.60 0.62 0.64 0.66 0.68 0.70 0.72 0.74 0.76 0.78

ENTROPY, B. T. U. PER DEGREE R.

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M. I. T., CAMBRIDGE, MASS.

E = INTERNAL ENERGY, B. T. U., ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR - N_2 AT 100°F

Q_v = INT. ENERGY OF COMBUSTION, AT 100°F., OF UNBURNED FUEL IN THE EQUILIBRIUM MIXTURE AT T. WHEN T ≦ 2880°R., Q_v = 336.

$E_s = E - Q_v$

H = ENTHALPY, $E + J(PV)$

$H_s = E_s + J(PV)$ [$\therefore H = H_s + Q_v$]

P = PRESSURE, LBS./SQ. IN. (DASHED LINES)

V = VOLUME, CU. FT. (SOLID LINES)

S = ENTROPY, ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR - N_2, EACH AT ONE ATMOSPHERE, 100°F

T = TEMPERATURE, °R = (°F + 460)

FUEL = $(CH_2)_x$

APPROXIMATE SCALE FOR HORIZONTAL INTERPOLATION BETWEEN PRESSURE OR VOLUME LINES

H - INTERPOLATION SCALE

INTERNAL ENERGY, 100'S B. T. U.

IN THIS RANGE $E - E_s = Q_v = 336$

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

DASHED LINES, PRESSURE

ALL VALUES OF EXTENSIVE VARIABLES TAKEN FROM THIS CHART ARE ON A MASS BASIS AND THEREFORE ARE REFERRED TO IN THE TEXT BY LOWER-CASE SYMBOLS.

F = 1.2
PRODUCTS OF COMBUSTION OF 1 LB. OF AIR WITH 120% OF THEORETICAL FUEL, IN CHEMICAL EQUILIBRIUM
0.08130 LBS. FUEL/LB. AIR

$\frac{H_s}{100}$ $\frac{E}{100}$ $\frac{E_s}{100}$

ENTROPY, B. T. U. PER DEGREE R.

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M. I. T., CAMBRIDGE, MASS.

E = INTERNAL ENERGY, B. T. U., ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR – N_2 AT 100°F

Q_v = INT. ENERGY OF COMBUSTION, AT 100°F., OF UNBURNED FUEL IN THE EQUILIBRIUM MIXTURE AT T. WHEN T ≤ 2880°R., Q_v = 336.

$E_s = E - Q_v$

H = ENTHALPY, $E + J(PV)$

$H_s = E_s + J(PV)$ [$\therefore H = H_s + Q_v$]

P = PRESSURE, LBS./SQ. IN. (DASHED LINES)

V = VOLUME, CU. FT. (SOLID LINES)

S = ENTROPY, ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR – N_2, EACH AT ONE ATMOSPHERE, 100°F

T = TEMPERATURE, °R = (°F + 460)

FUEL = $(CH_2)_x$

APPROXIMATE SCALE FOR HORIZONTAL INTERPOLATION BETWEEN PRESSURE OR VOLUME LINES

H - INTERPOLATION SCALE

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

DASHED LINES, PRESSURE

F = 1.2
PRODUCTS OF COMBUSTION OF 1 LB. OF AIR WITH 120% OF THEORETICAL FUEL, IN CHEMICAL EQUILIBRIUM 0.08130 LBS. FUEL/LB. AIR

ALL VALUES OF EXTENSIVE VARIABLES TAKEN FROM THIS CHART ARE ON A MASS BASIS AND THEREFORE ARE REFERRED TO IN THE TEXT BY LOWER-CASE SYMBOLS.

$\frac{H_s}{100}$ $\frac{E}{100}$

ENTROPY, B. T. U. PER DEGREE R.

$\frac{E}{100}$

INTERNAL ENERGY, 100'S B. T. U.

IN THIS RANGE $E - E_s = Q_v = 336$

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M. I. T., CAMBRIDGE, MASS.

E = INTERNAL ENERGY, B. T. U., ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR-N_2 AT 100°F

Q_v = INT. ENERGY OF COMBUSTION, AT 100°F., OF UNBURNED FUEL IN THE EQUILIBRIUM MIXTURE AT T. WHEN $T \leqq 2880°R.$, $Q_v = 1.5, 2.0, 3.0,$ AT $S = 0.4, 0.6, 0.8,$ RESPECTIVELY

$E_s = E - Q_v$

H = ENTHALPY, $E + J(PV)$

$H_s = E_s + J(PV)$ $[\cdot\ H = H_s + Q_v]$

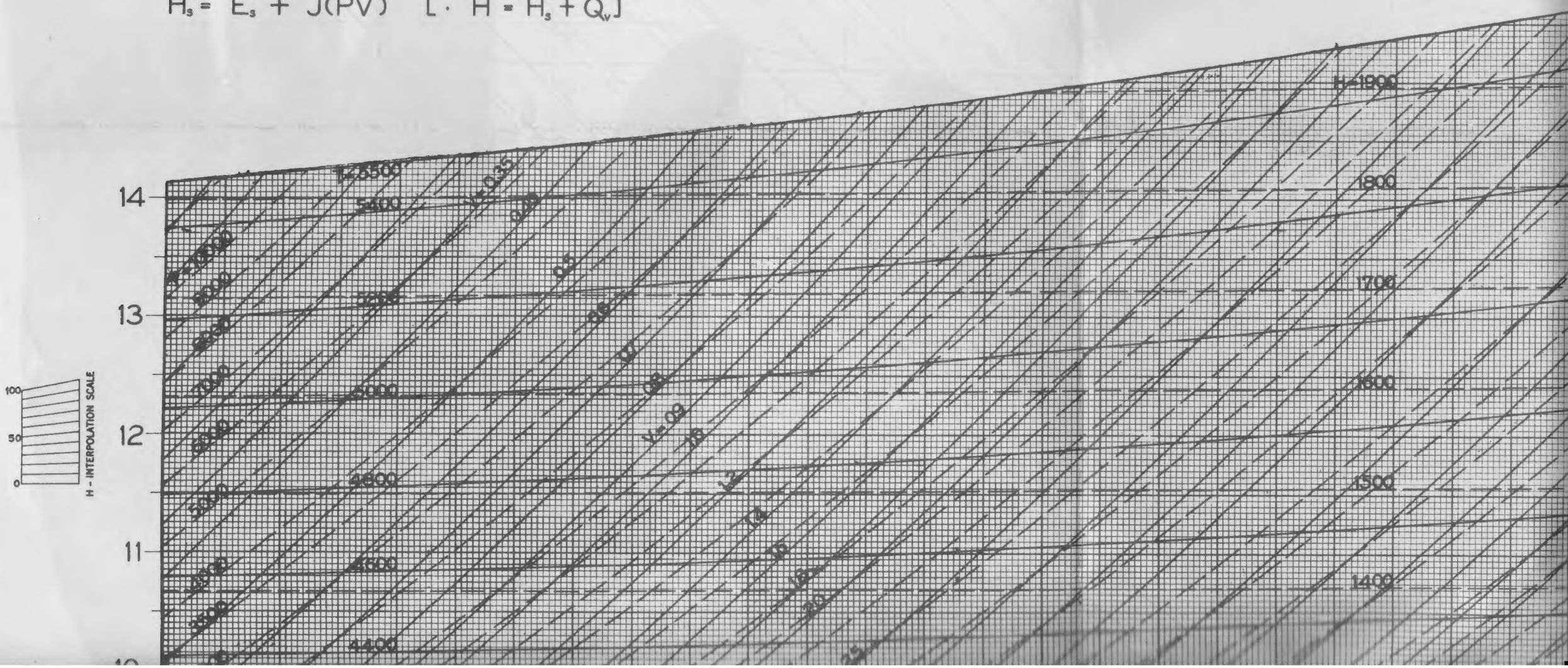
P = PRESSURE, LBS./SQ. IN. (DASHED LINES)

V = VOLUME, CU. FT. (SOLID LINES)

S = ENTROPY, ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR-N_2, EACH AT ONE ATMOSPHERE, 100°F

T = TEMPERATURE, °R = (°F + 460)

FUEL = $(CH_2)_x$



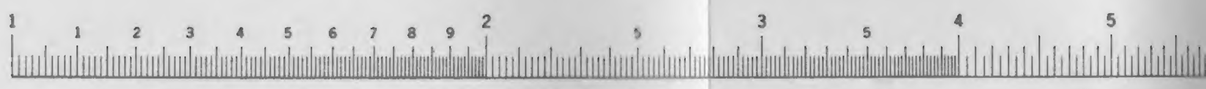
RESSURE, LBS./SQ. IN.
DASHED LINES)

OLUME, CU. FT. (SOLID LINES)

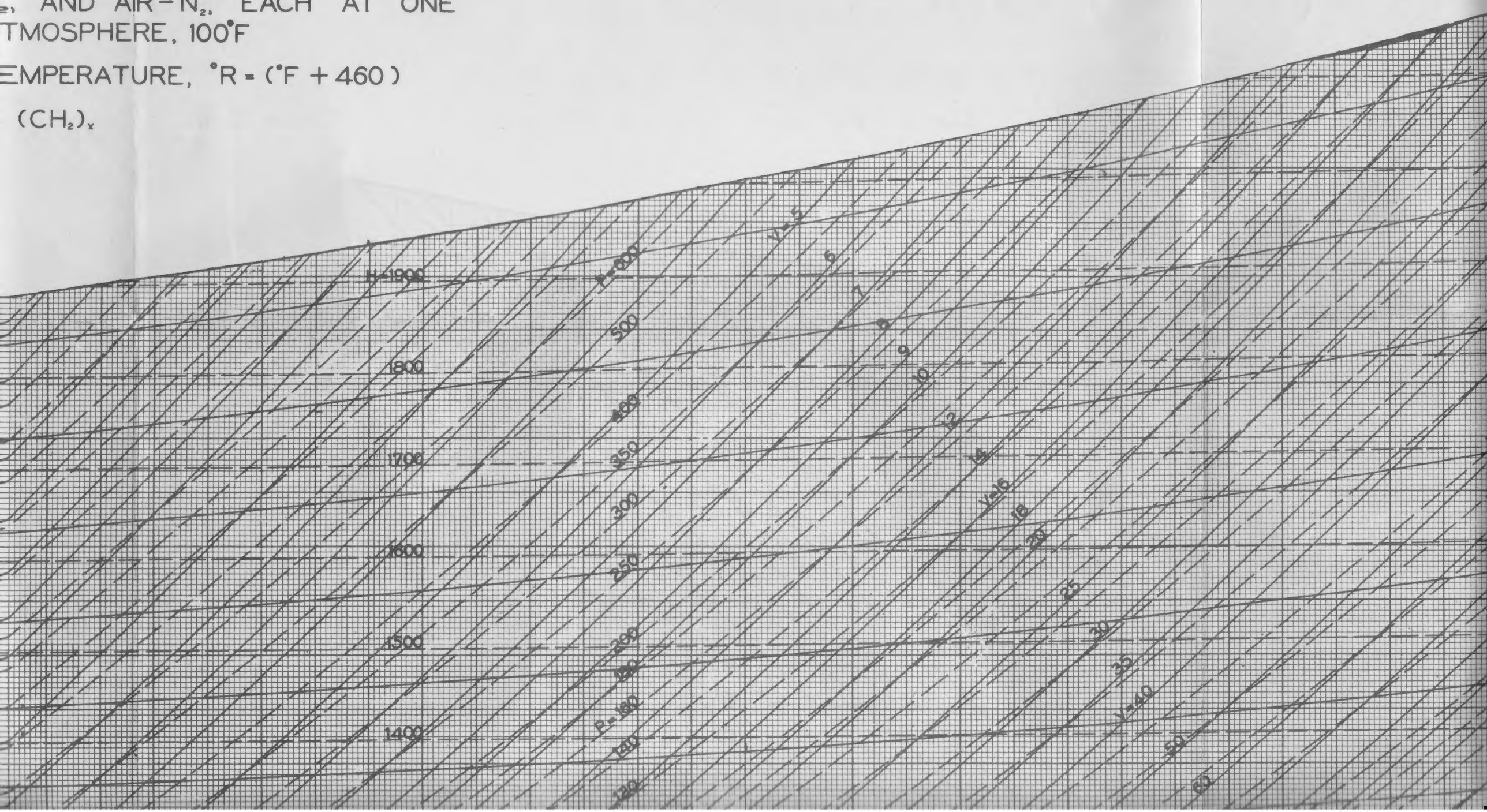
NTROPY, ABOVE CO_2, H_2O (VAPOR),
$_2$, AND AIR-N_2, EACH AT ONE
TMOSPHERE, 100°F

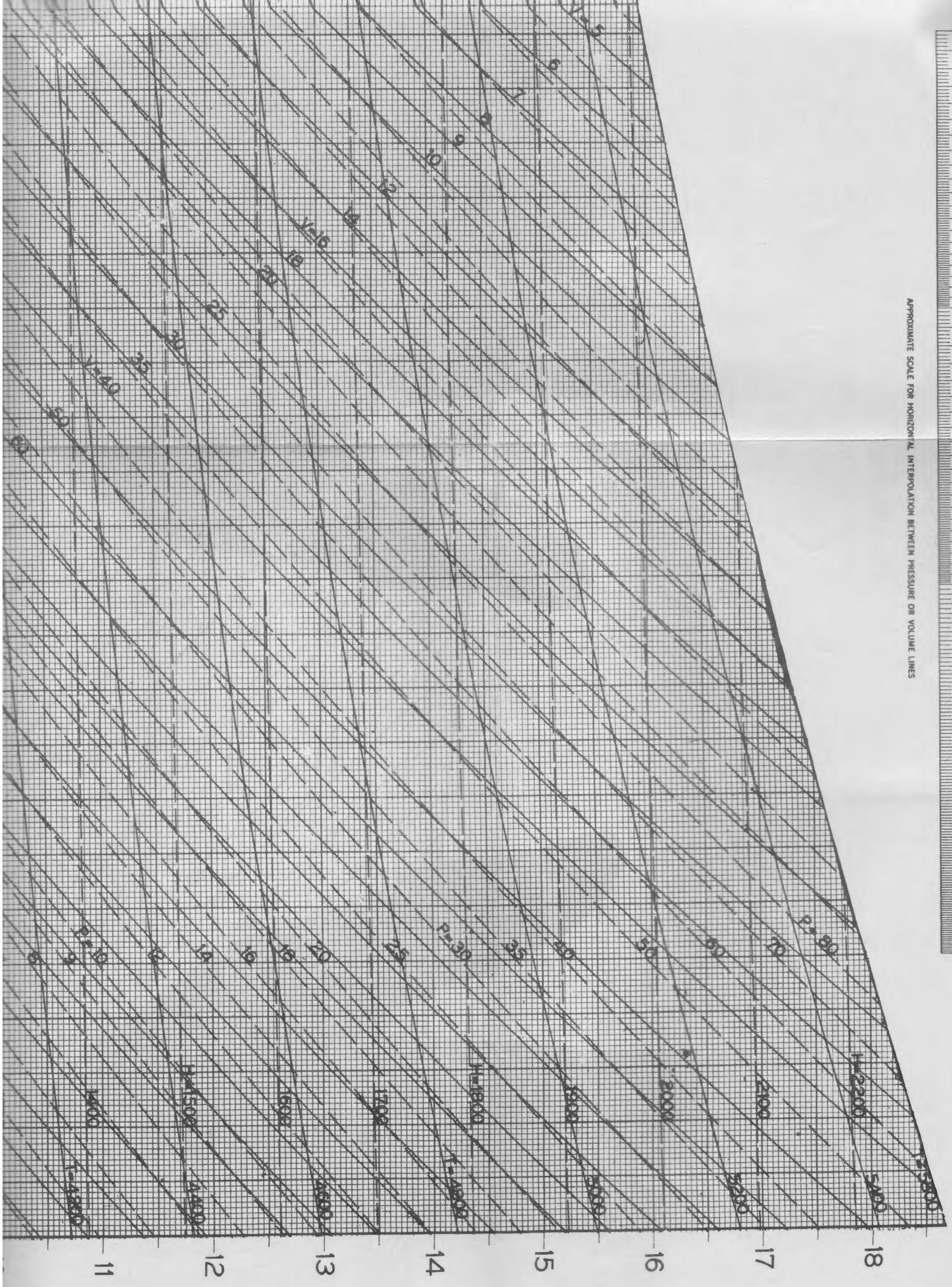
EMPERATURE, °R = (°F + 460)

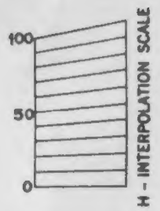
$(CH_2)_x$



APPROXIMATE SCALE FOR HORIZONTAL INTERPOLATION BETWEEN PRESSURE OR VOLUME LINES

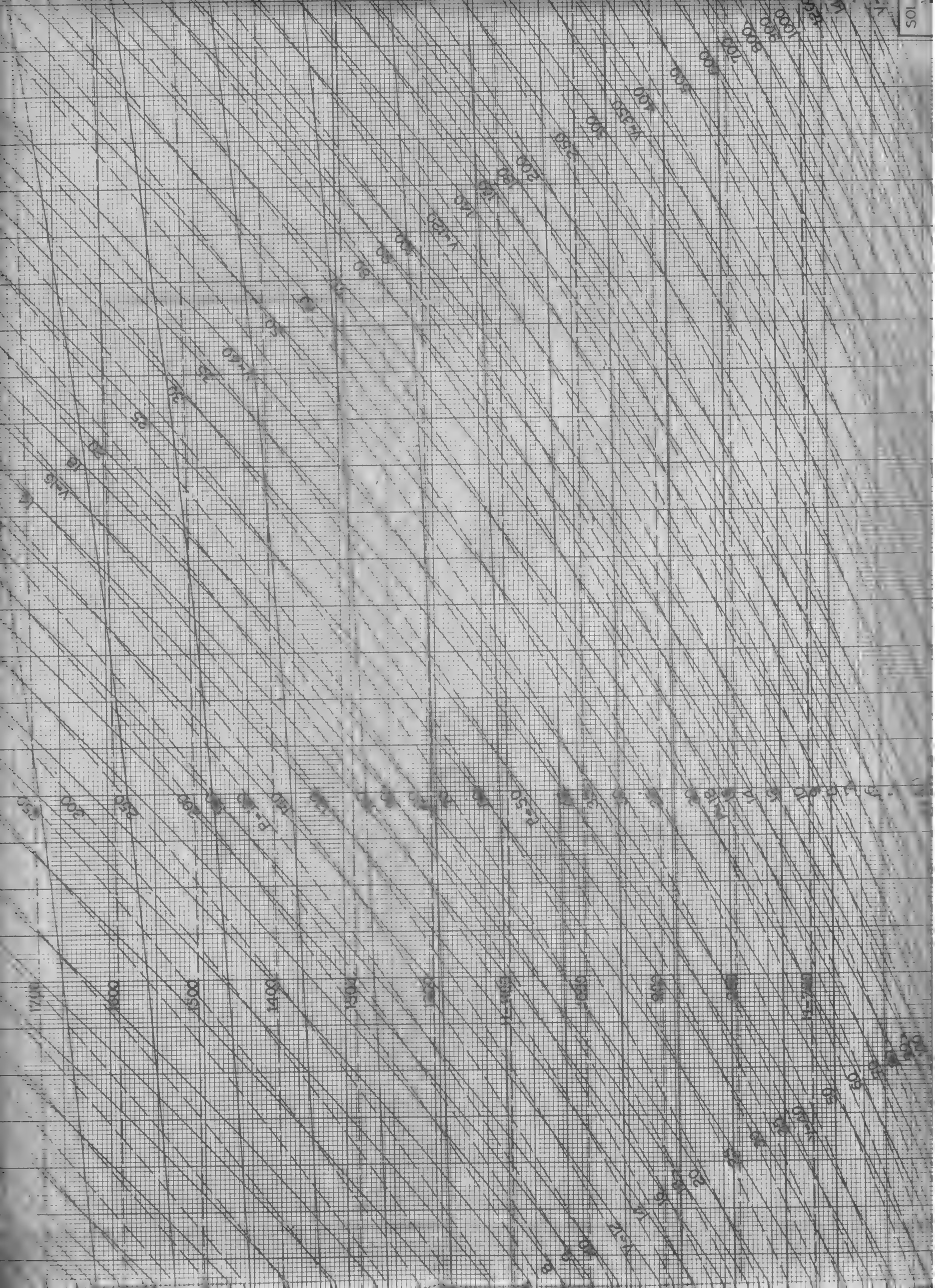


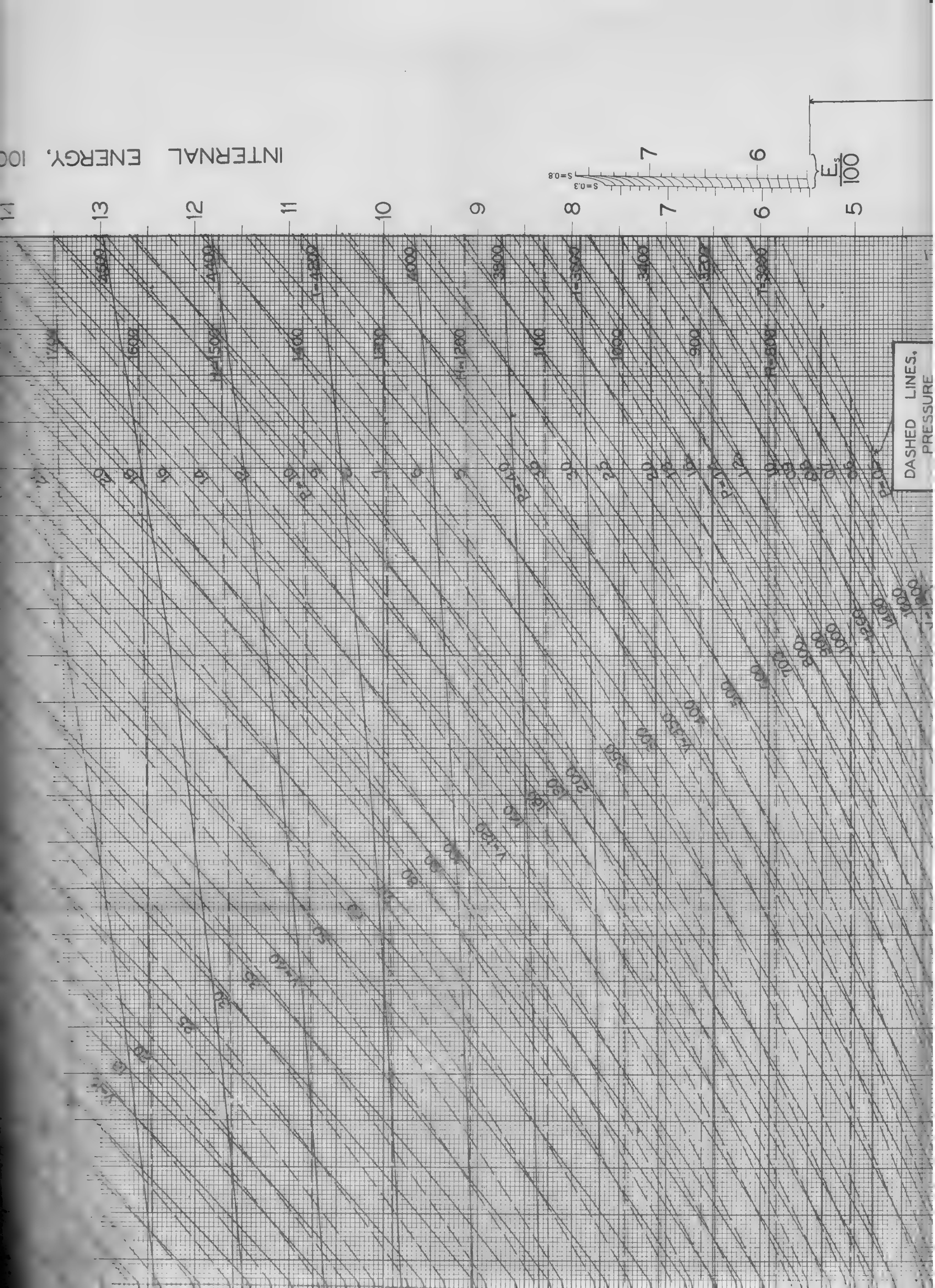

APPROXIMATE SCALE FOR HORIZONTAL INTERPOLATION BETWEEN PRESSURE OR VOLUME LINES
INTERNAL ENERGY, 100'S B.T.U.
11
12
13
14
15
16
17
18
P=10
P=30
P=80
H=1400
H=1500
H=1600
H=1700
H=1800
H=1900
H=2000
H=2100
H=2200
H=2300
5400
5500
5600
5700
5800
5900
6000
6100
6200
6300
6400
6500
6600
6700
6800
6900
7000
7100
7200
7300
7400
7500
7600
7700
7800
7900
8000
8100
8200
8300
8400
8500
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9700
9800
9900
10000

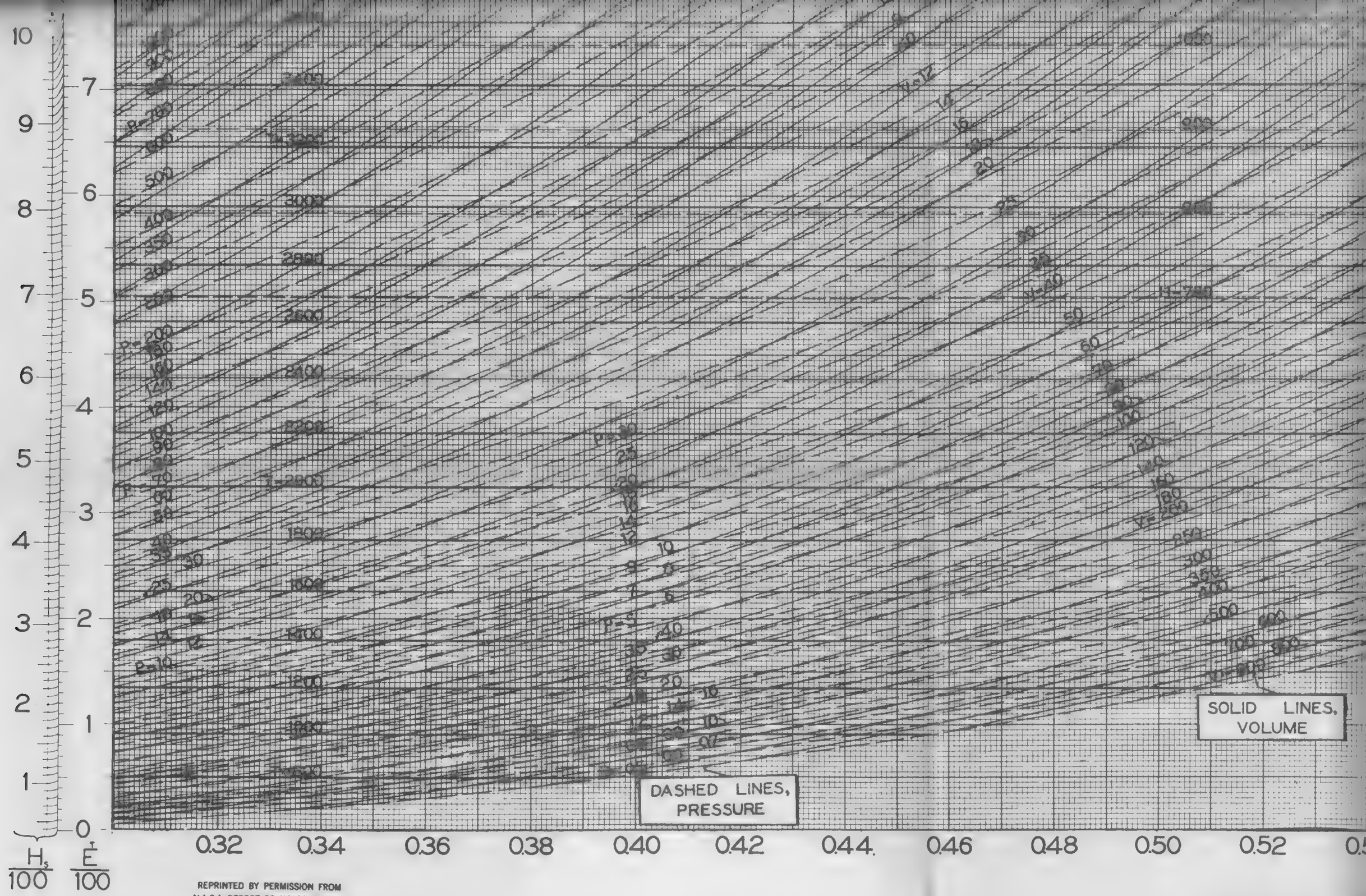


$\frac{H_s}{100}$

S=0.3 S=0.8




INTERNAL ENERGY, 100
DASHED LINES, PRESSURE
S=0.3
S=0.8
$\frac{E_i}{100}$



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DASHED LINES, PRESSURE

SOLID LINES, VOLUME

ALL VALUES OF EXTENSIVE VARIABLES TAKEN FROM THIS CHART ARE ON A MASS BASIS AND THEREFORE ARE REFERRED TO IN THE TEXT BY LOWER-CASE SYMBOLS.

0.44 0.46 0.48 0.50 0.52 0.54 0.56 0.58 0.60 0.62 0.64 0.66 0.68 0.70

ENTROPY, B.T.U. PER DEGREE R.

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

IN THIS RANGE,	
S	Q_v
0.3	1.0
0.4	1.5
0.5	1.5
0.6	2.0
0.7	2.5
0.8	3.0

$\frac{E_s}{100}$

F = 0.9
PRODUCTS OF COMBUSTION
OF 1 LB. OF AIR WITH
90% OF THEORETICAL FUEL,
IN CHEMICAL EQUILIBRIUM
0.06098 LBS. FUEL/LB. AIR

ALL VALUES OF EXTENSIVE VARIABLES TAKEN FROM THIS CHART ARE ON A MASS BASIS AND THEREFORE ARE REFERRED TO IN THE TEXT BY LOWER-CASE SYMBOLS.

0.58 0.60 0.62 0.64 0.66 0.68 0.70 0.72 0.74 0.76 0.78 $\frac{E}{100}$

EGREE R.

M.I.T., CAMBRIDGE MASS.

E = INTERNAL ENERGY, B. T. U., ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR – N_2 AT 100°F

Q_v = INT. ENERGY OF COMBUSTION, AT 100°F., OF UNBURNED FUEL IN THE EQUILIBRIUM MIXTURE AT T. WHEN $T \leq 2880°R.$, $Q_v = 2.0, 2.5, 4.0$, AT $S = 0.4, 0.6, 0.8$, RESPECTIVELY

$E_s = E - Q_v$

H = ENTHALPY, $E + J(PV)$

$H_s = E_s + J(PV)$ $[\therefore H = H_s + Q_v]$

P = PRESSURE, LBS./SQ. IN. (DASHED LINES)

V = VOLUME, CU. FT. (SOLID LINES)

S = ENTROPY, ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR – N_2, EACH AT ONE ATMOSPHERE, 100°F

T = TEMPERATURE, °R = (°F + 460)

FUEL = $(CH_2)_x$



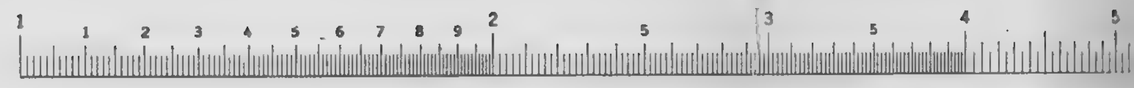
P = PRESSURE, LBS./SQ. IN. (DASHED LINES)

V = VOLUME, CU. FT. (SOLID LINES)

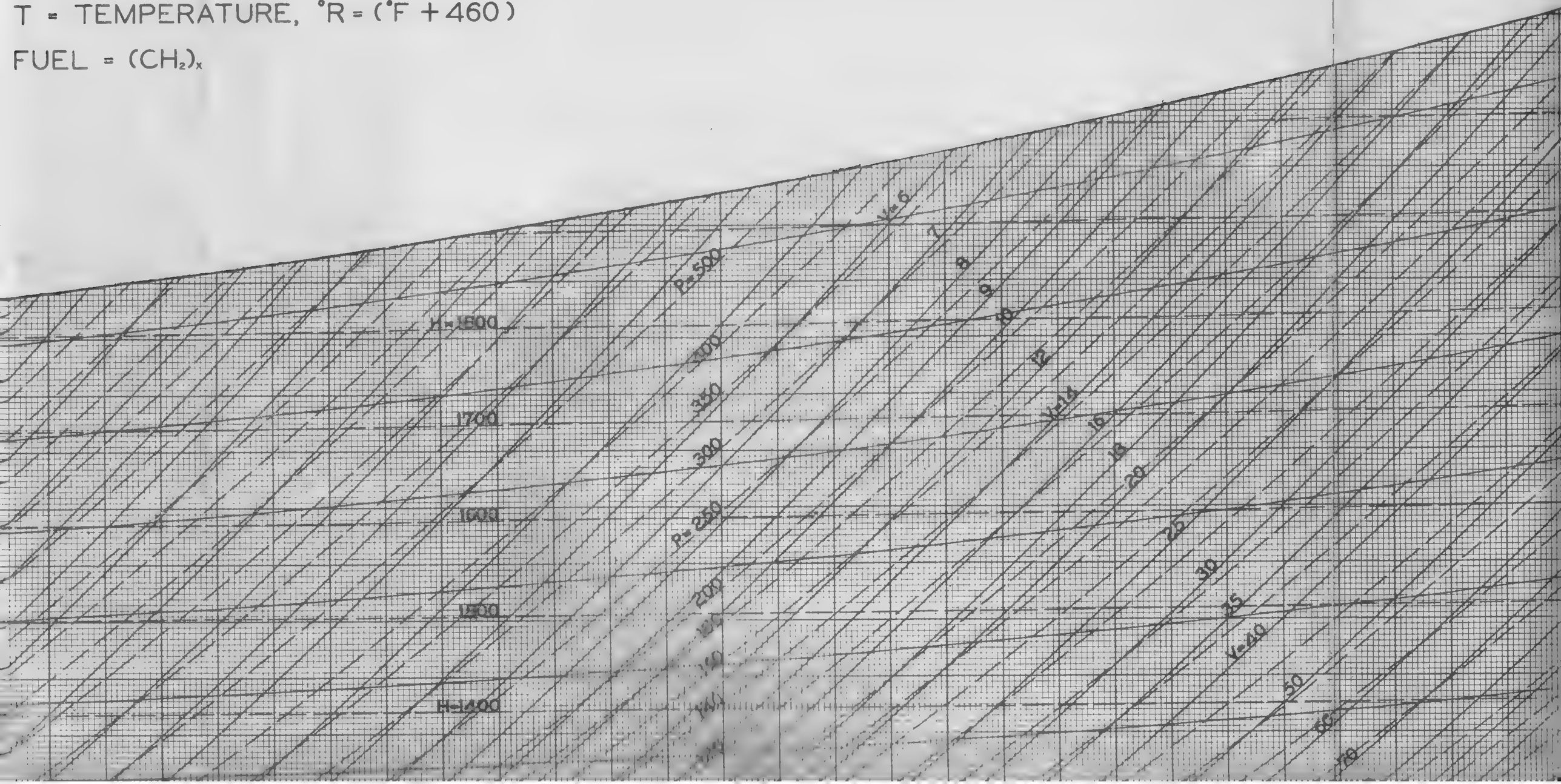
S = ENTROPY, ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR – N_2, EACH AT ONE ATMOSPHERE, 100°F

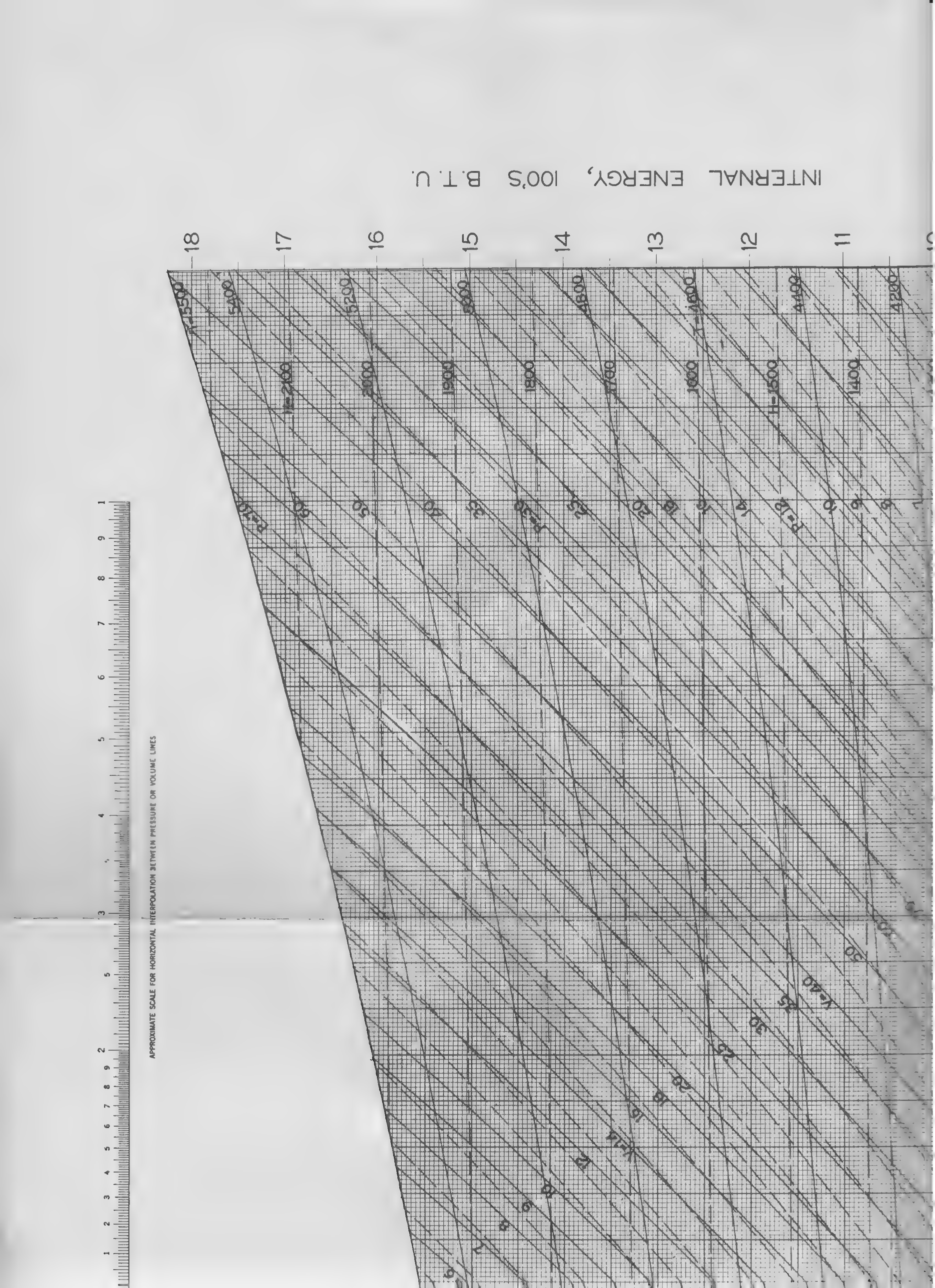
T = TEMPERATURE, °R = (°F + 460)

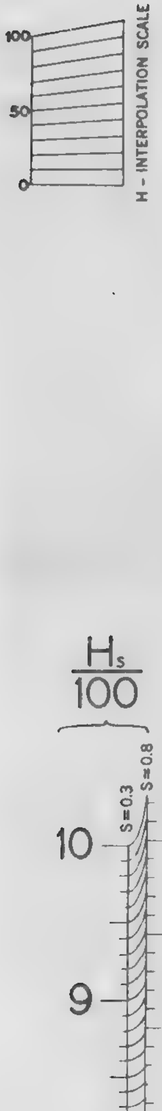
FUEL = $(CH_2)_x$



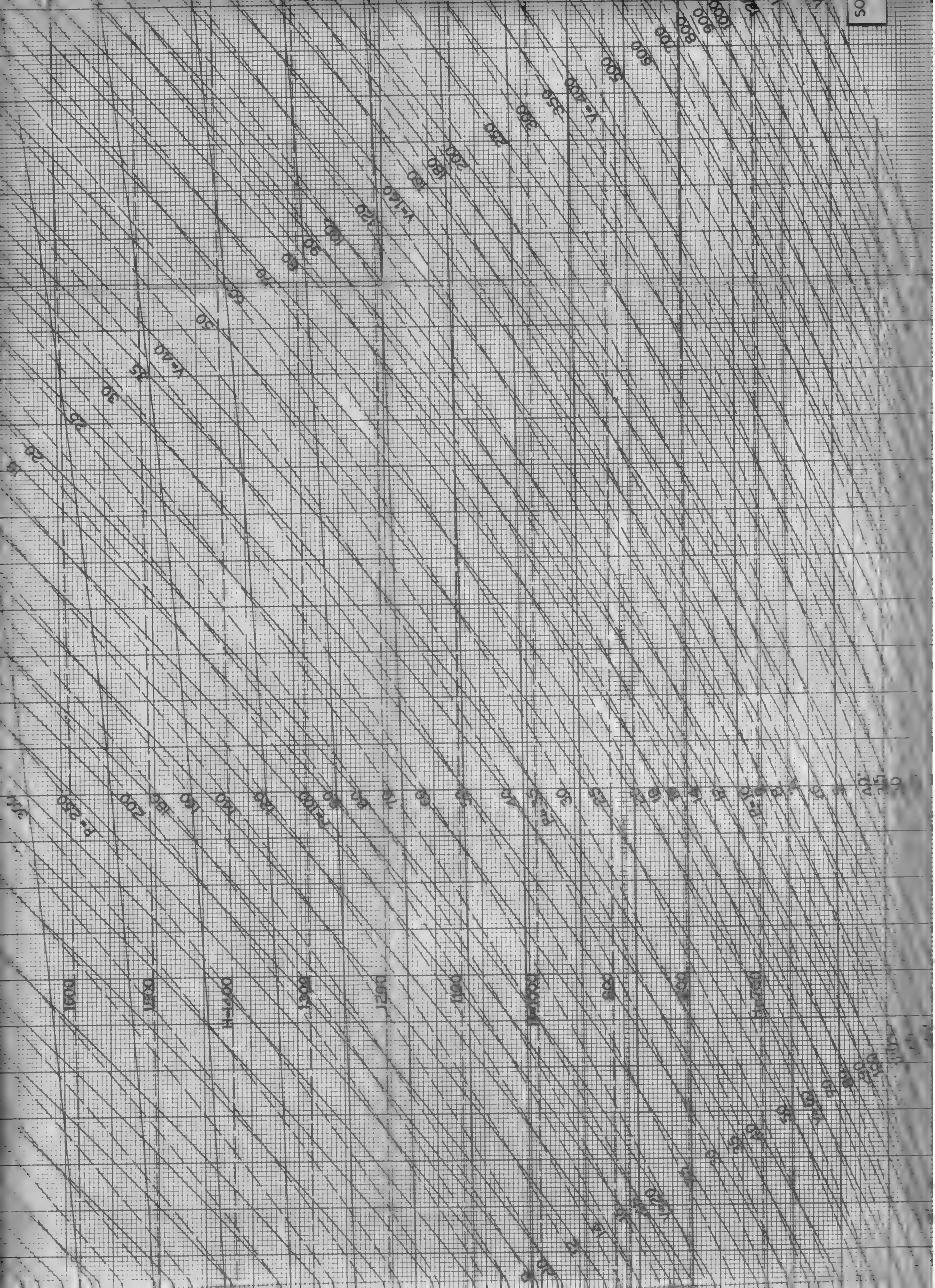
APPROXIMATE SCALE FOR HORIZONTAL INTERPOLATION BETWEEN PRESSURE OR VOLUME LINES




INTERNAL ENERGY, 100's B.T.U.
APPROXIMATE SCALE FOR HORIZONTAL INTERPOLATION BETWEEN PRESSURE OR VOLUME LINES



$\frac{H_s}{100}$



INTERNAL ENER

13
12
11
10
9
8
7
6
5
4

V=40
V=140
V=400
V=1000
V=1800

P=10
P=12
P=14
P=16
P=20
P=25
P=30
P=35
P=40

T=4600
T=4000
T=3200

H=1500
H=1400
H=1200
H=1100
H=1068
H=1000
H=900
H=800

4400
4200
3800
3600
3400

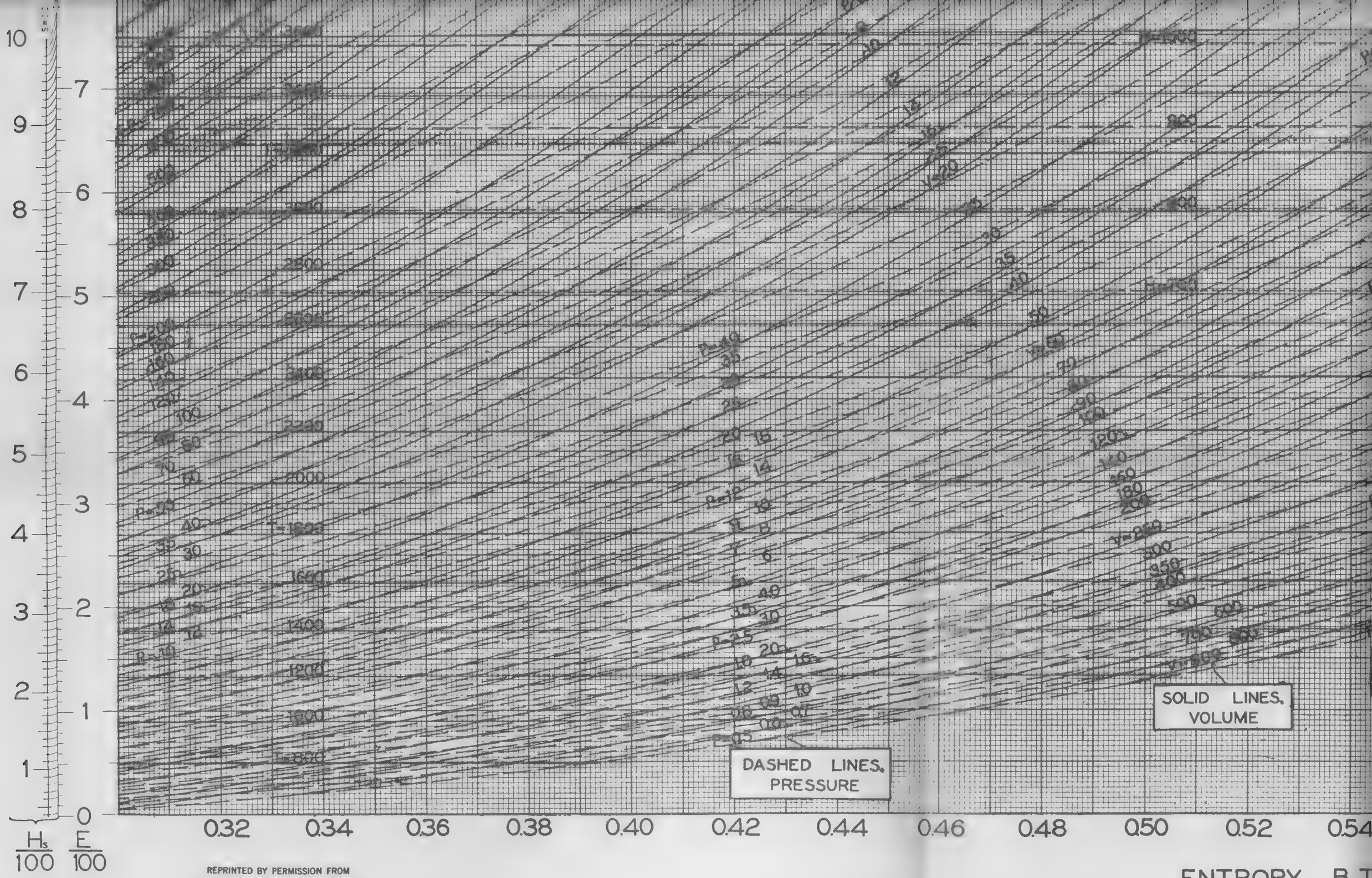
S=0.3
S=0.8

$\frac{E_s}{100}$

DASHED LINES.
PRESSURE

SOLID LINES.
VOLUMI

IN THIS RANGE,



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DASHED LINES, PRESSURE

SOLID LINES, VOLUME

ALL VALUES OF EXTENSIVE VARIABLES TAKEN FROM THIS CHART ARE ON A MASS BASIS AND THEREFORE ARE REFERRED TO IN THE TEXT BY LOWER-CASE SYMBOLS.

0.44 0.46 0.48 0.50 0.52 0.54 0.56 0.58 0.60 0.62 0.64 0.66 0.68 0.70

ENTROPY, B.T.U. PER DEGREE R.

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

$\frac{E_s}{100}$

IN THIS RANGE,	
S	Q_v
0.3	1.5
0.4	2.0
0.5	2.0
0.6	2.5
0.7	3.0
0.8	4.0

F = 0.8

PRODUCTS OF COMBUSTION OF 1 LB. OF AIR WITH 80% OF THEORETICAL FUEL, IN CHEMICAL EQUILIBRIUM 0.05420 LBS. FUEL/LB. AIR

ALL VALUES OF EXTENSIVE VARIABLES TAKEN FROM THIS CHART ARE ON A MASS BASIS AND THEREFORE ARE REFERRED TO IN THE TEXT BY LOWER-CASE SYMBOLS.

$\frac{E}{100}$

GREE R.

M. I. T., CAMBRIDGE, MASS.

E = INTERNAL ENERGY, B. T. U., ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR – N_2 AT 100°F

Q_v = INT. ENERGY OF COMBUSTION, AT 100°F., OF UNBURNED FUEL IN THE EQUILIBRIUM MIXTURE AT T. WHEN $T \leq 2880°R.$, $Q_v = 1, 2, 5$, AT $S = 0.4, 0.6, 0.8$, RESPECTIVELY

$E_s = E - Q_v$

H = ENTHALPY, $E + J(PV)$

$H_s = E_s + J(PV)$ $[\therefore H = H_s + Q_v]$

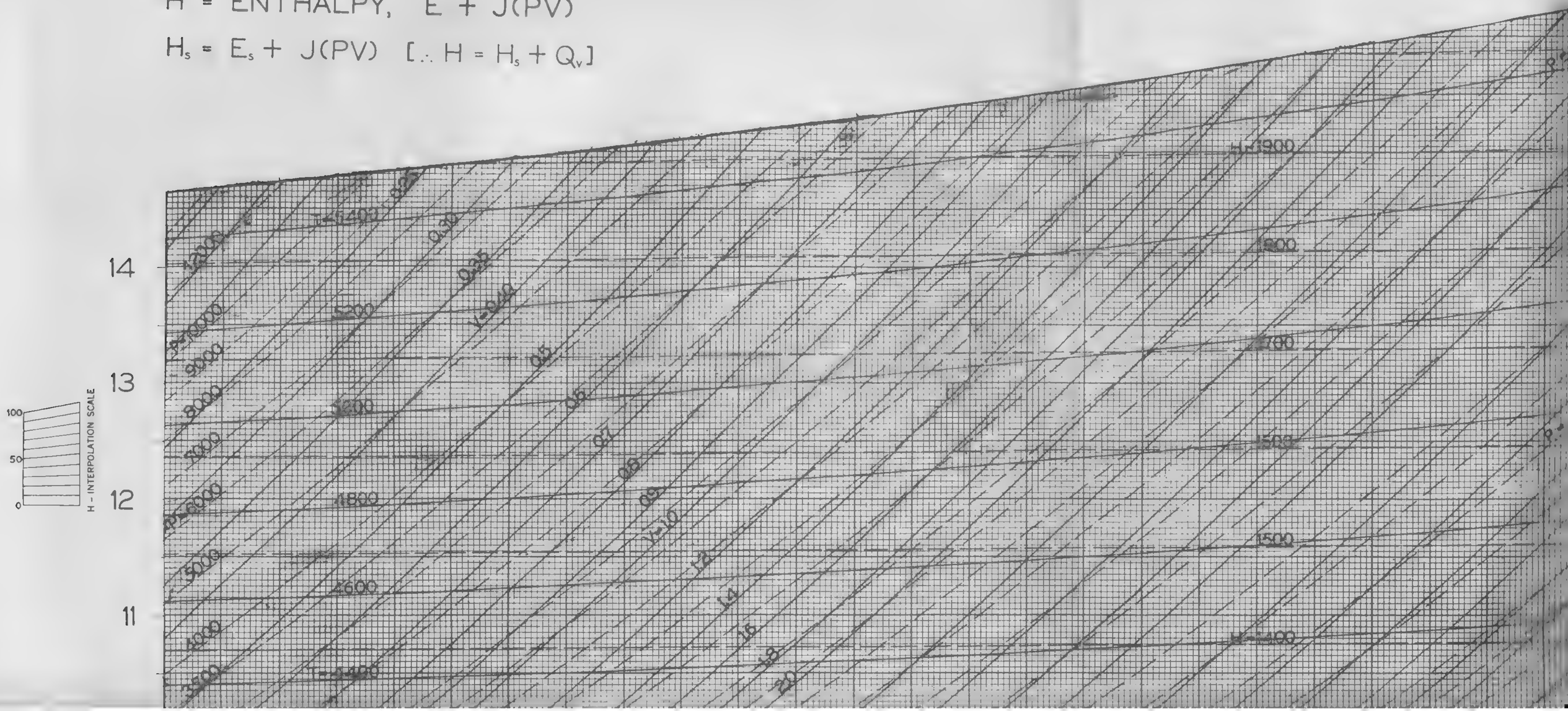
P = PRESSURE, LBS./SQ. IN. (DASHED LINES)

V = VOLUME, CU. FT. (SOLID LINES)

S = ENTROPY, ABOVE CO_2, H_2O (VAPOR) O_2, AND AIR – N_2, EACH AT ONE ATMOSPHERE, 100°F.

T = TEMPERATURE, °R = (°F + 460)

FUEL = $(CH_2)_x$



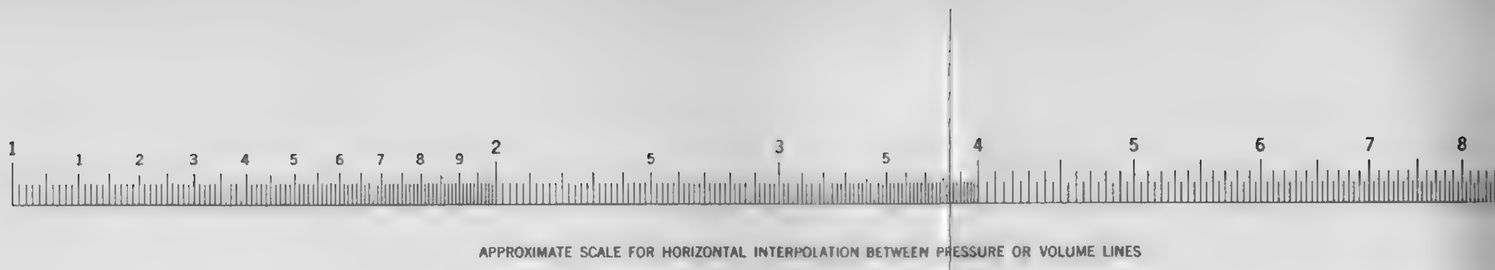
PRESSURE, LBS./SQ. IN.
(DASHED LINES)

VOLUME, CU. FT. (SOLID LINES)

ENTROPY, ABOVE CO_2, H_2O (VAPOR)
O_2, AND AIR-N_2, EACH AT ONE
ATMOSPHERE, 100°F.

TEMPERATURE, °R = (°F + 460)

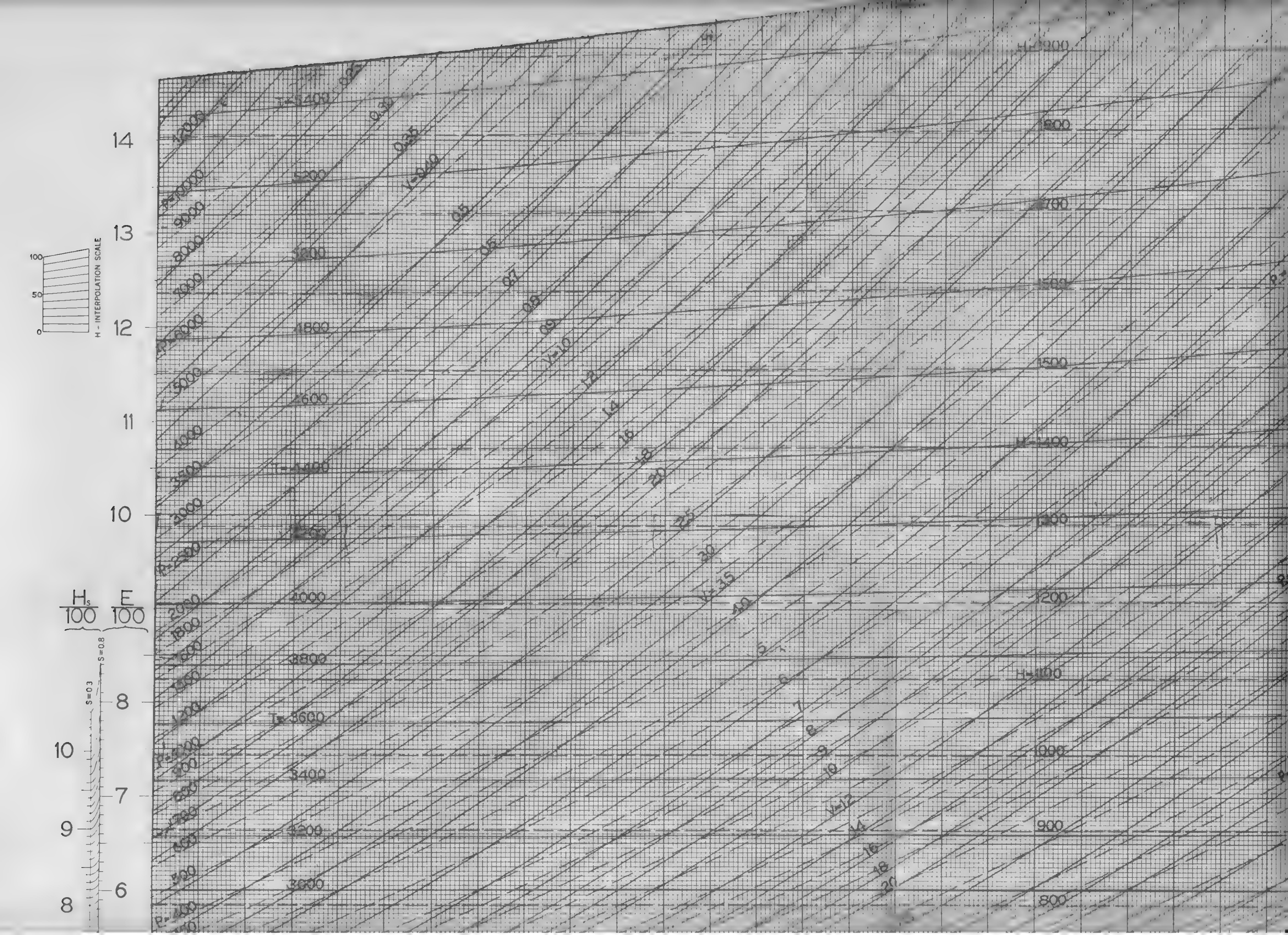
$= (CH_2)_x$

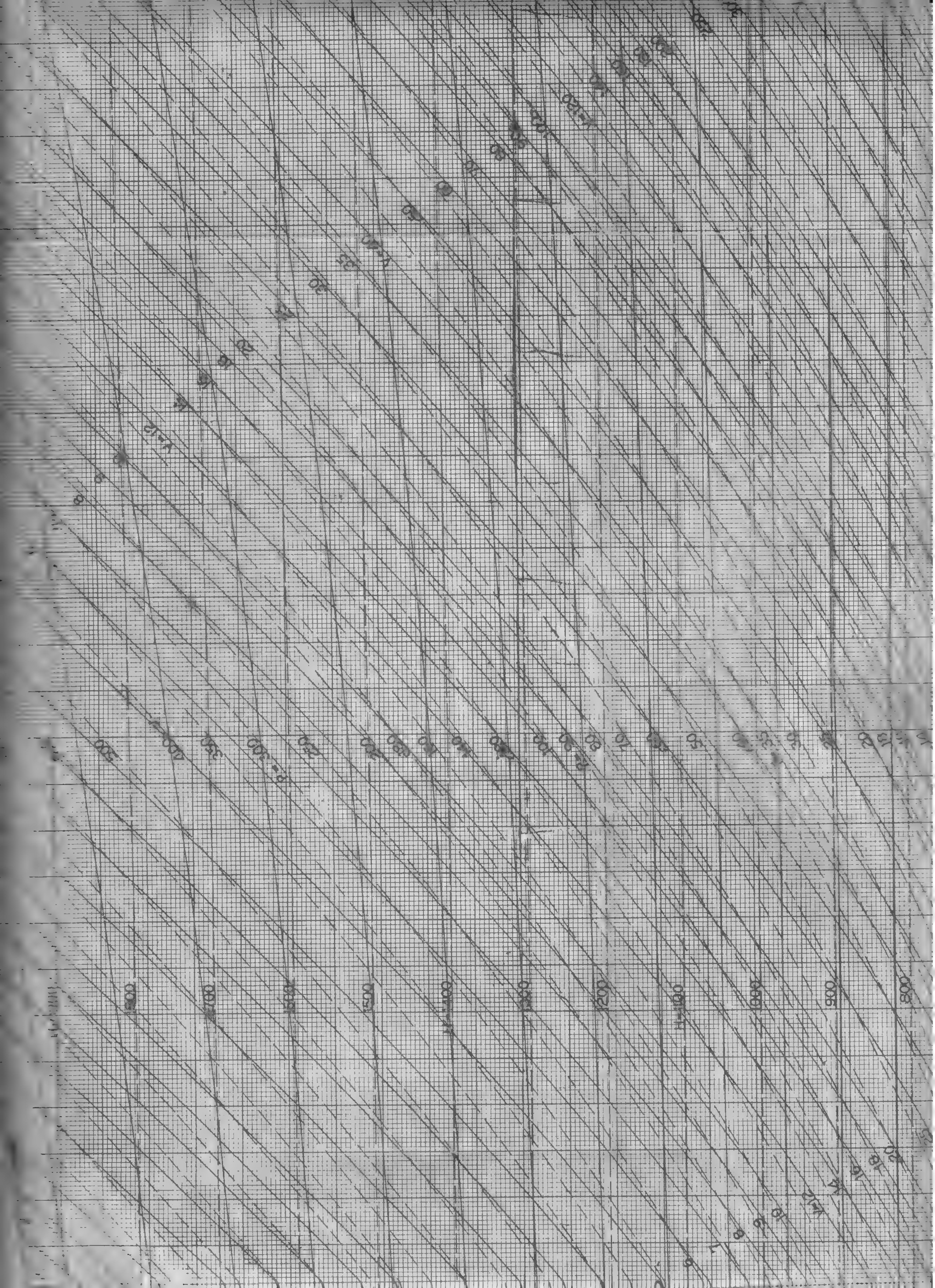


APPROXIMATE SCALE FOR HORIZONTAL INTERPOLATION BETWEEN PRESSURE OR VOLUME LINES

APPROXIMATE SCALE FOR HORIZONTAL INTERPOLATION BETWEEN PRESSURE OR VOLUME LINES

INTERNAL ENERGY, 100'S B. T. U.


H - INTERPOLATION SCALE
100
50
0
$\frac{H_s}{100}$ $\frac{E}{100}$
S=0.3
S=0.8
14
13
12
11
10
10
8
7
9
6
8
H=1500
H=1400
H=1300
H=1200
H=1100
H=1000
H=900
H=800
T=4400
T=4000
T=3600
T=3400
T=3200
T=3000
T=2800
T=2600
T=2400
T=2200
T=2000
V=40
V=35
V=30
V=25
V=20
V=15
V=12
V=10



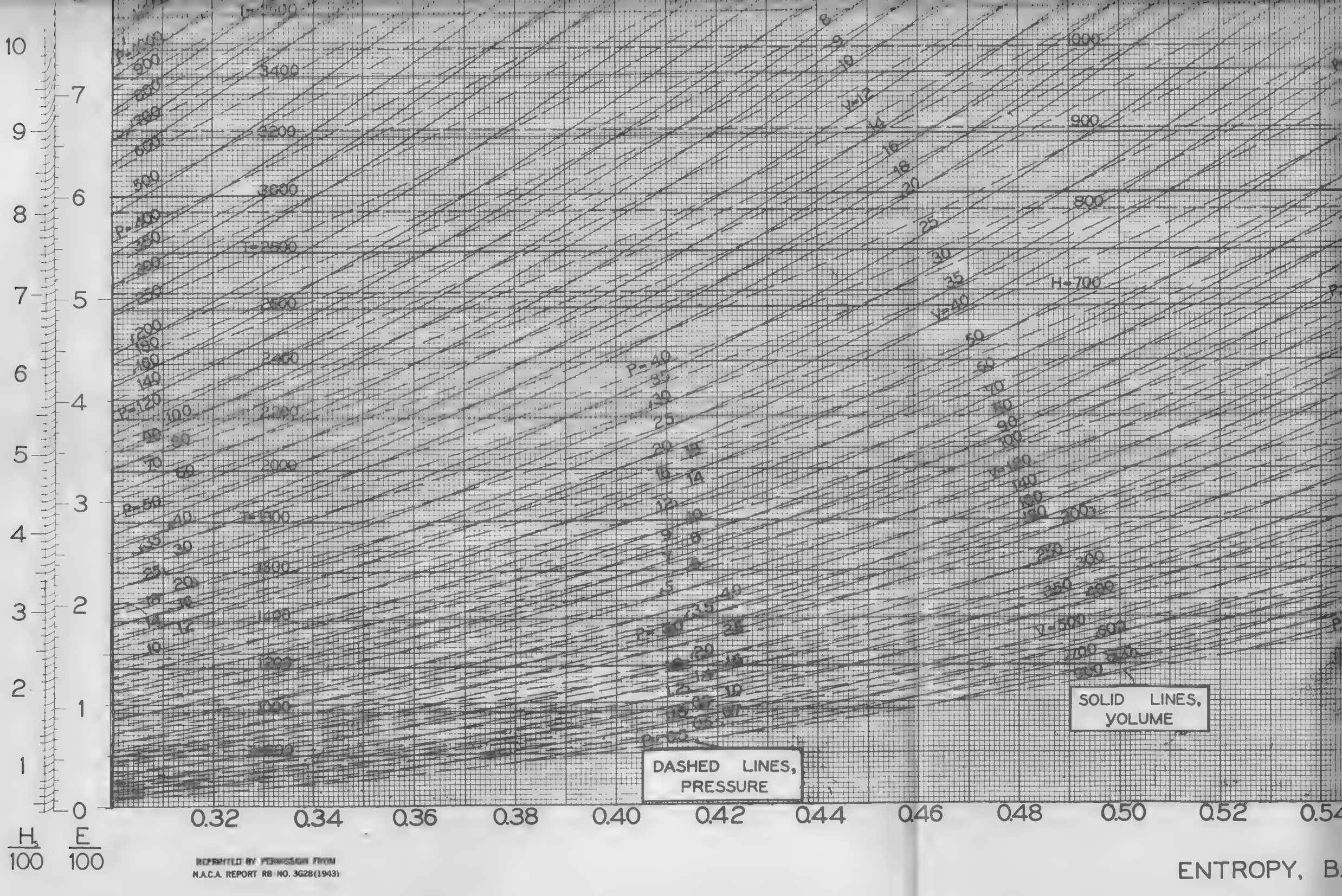
INTERNAL ENERGY, 100's

$\frac{E_s}{100}$

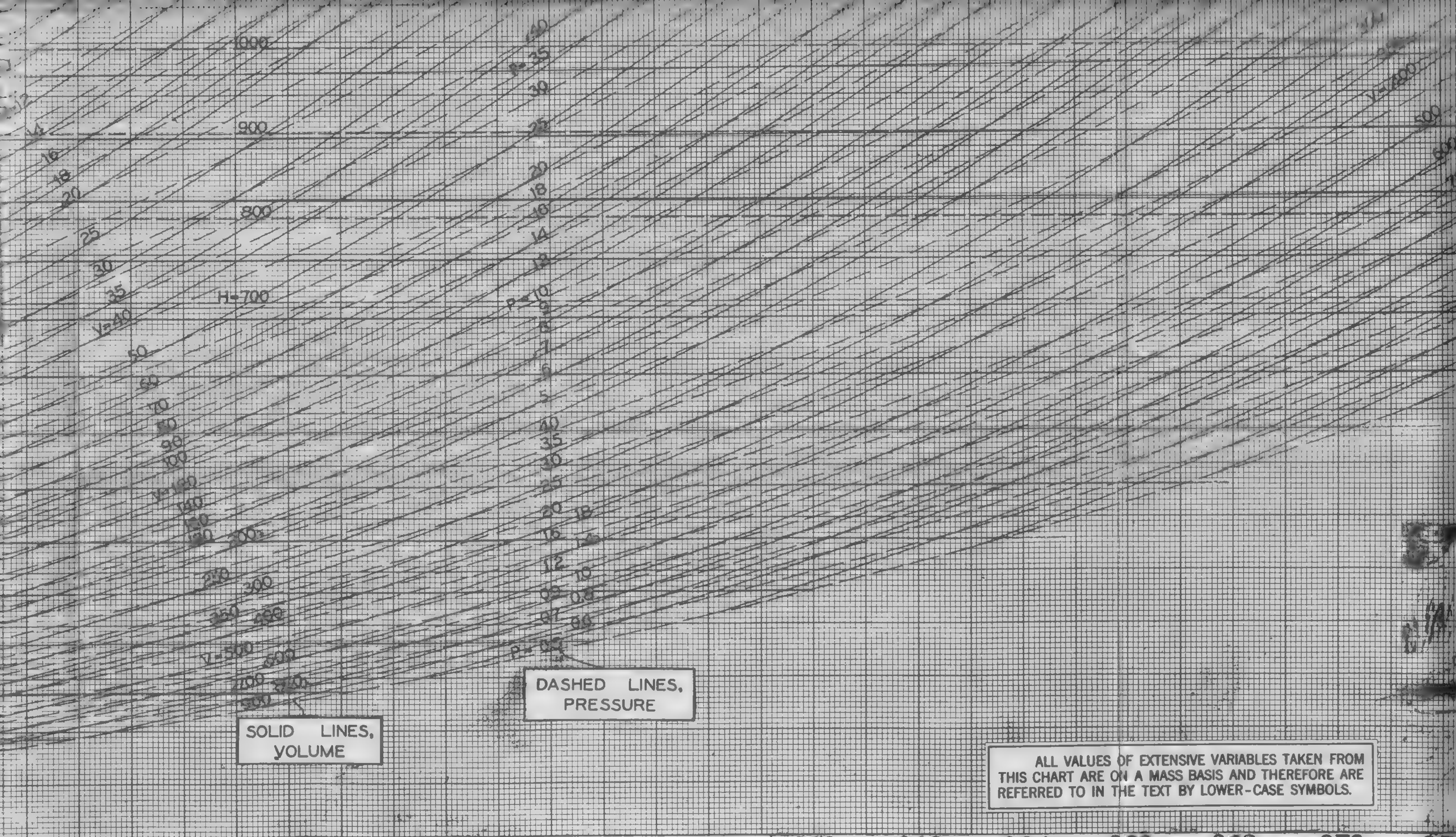
S=0.3

S=0.8

DASHED LINES



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SOLID LINES, VOLUME
DASHED LINES, PRESSURE
ALL VALUES OF EXTENSIVE VARIABLES TAKEN FROM THIS CHART ARE ON A MASS BASIS AND THEREFORE ARE REFERRED TO IN THE TEXT BY LOWER-CASE SYMBOLS.
0.46
0.48
0.50
0.52
0.54
0.56
0.58
0.60
0.62
0.64
0.66
0.68
0.70
ENTROPY, B.T.U. PER DEGREE R.

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

$\frac{E_s}{100}$

IN THIS RANGE,	
S	Q_v
0.3	0.5
0.4	1.0
0.5	1.5
0.6	2.0
0.7	3.0
0.8	5.0

F = 1.0

PRODUCTS OF COMBUSTION OF 1 LB. OF AIR WITH THE THEORETICAL FUEL, IN CHEMICAL EQUILIBRIUM 0.06775 LBS. FUEL/LB. AIR

ALL VALUES OF EXTENSIVE VARIABLES TAKEN FROM THIS CHART ARE ON A MASS BASIS AND THEREFORE ARE REFERRED TO IN THE TEXT BY LOWER-CASE SYMBOLS.

$\frac{E}{100}$

EGREE R.

M.I.T., CAMBRIDGE, MASS.

E = INTERNAL ENERGY, B.T.U., ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR – N_2 AT 100°F.

Q_v = INT. ENERGY OF COMBUSTION, AT 100°F., OF UNBURNED FUEL IN THE EQUILIBRIUM MIXTURE AT T. WHEN T ≤ 2880°R., Q_v = 169.

$E_s = E - Q_v$

H = ENTHALPY, $E + J(PV)$

$H_s = E_s + J(PV)$ [$\therefore H = H_s + Q_v$]

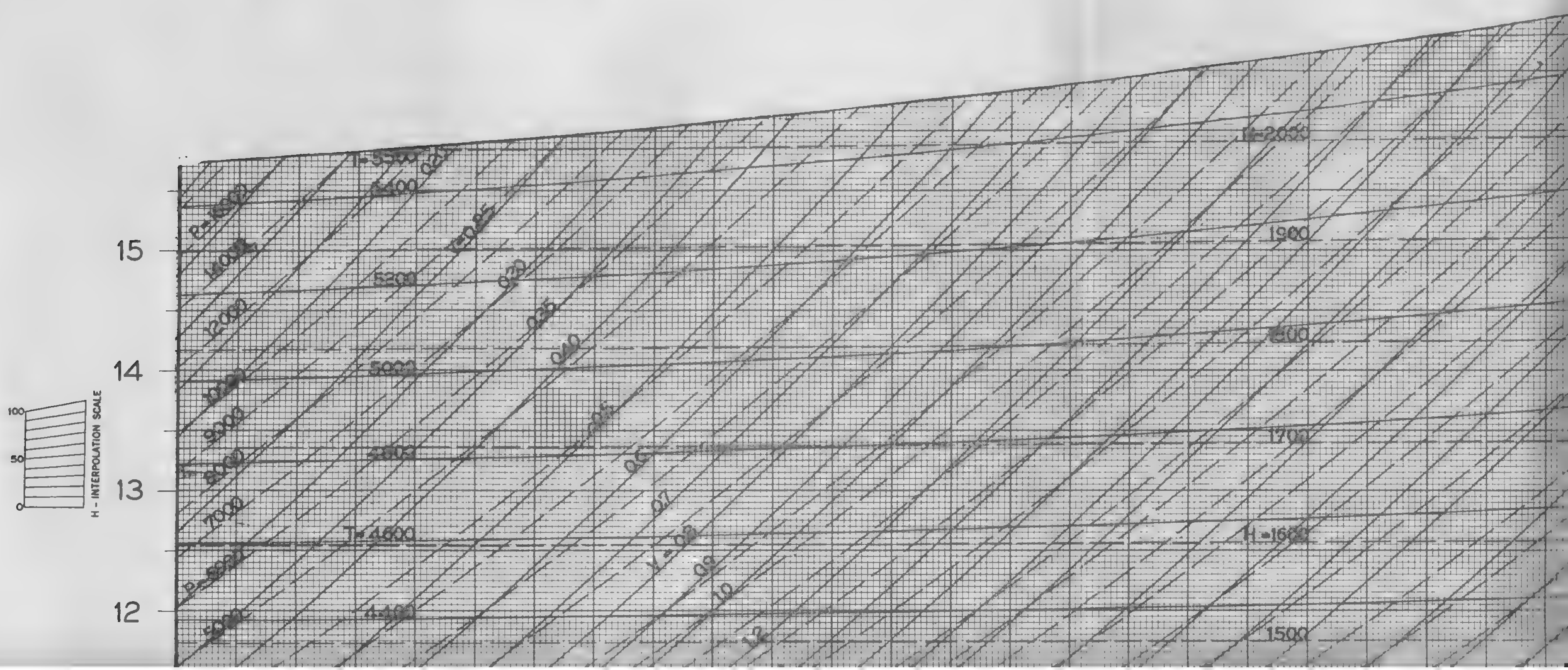
P = PRESSURE, LBS./SQ. IN. (DASHED LINES)

V = VOLUME, CU. FT. (SOLID LINES)

S = ENTROPY, ABOVE CO_2, H_2O (VAPOR) O_2, AND AIR – N_2, EACH AT ONE ATMOSPHERE, 100°F.

T = TEMPERATURE, °R = (°F + 460)

FUEL = $(CH_2)_x$



P = PRESSURE, LBS./SQ. IN. (DASHED LINES)

V = VOLUME, CU. FT. (SOLID LINES)

S = ENTROPY, ABOVE CO_2, H_2O (VAPOR) O_2, AND AIR-N_2, EACH AT ONE ATMOSPHERE, 100°F.

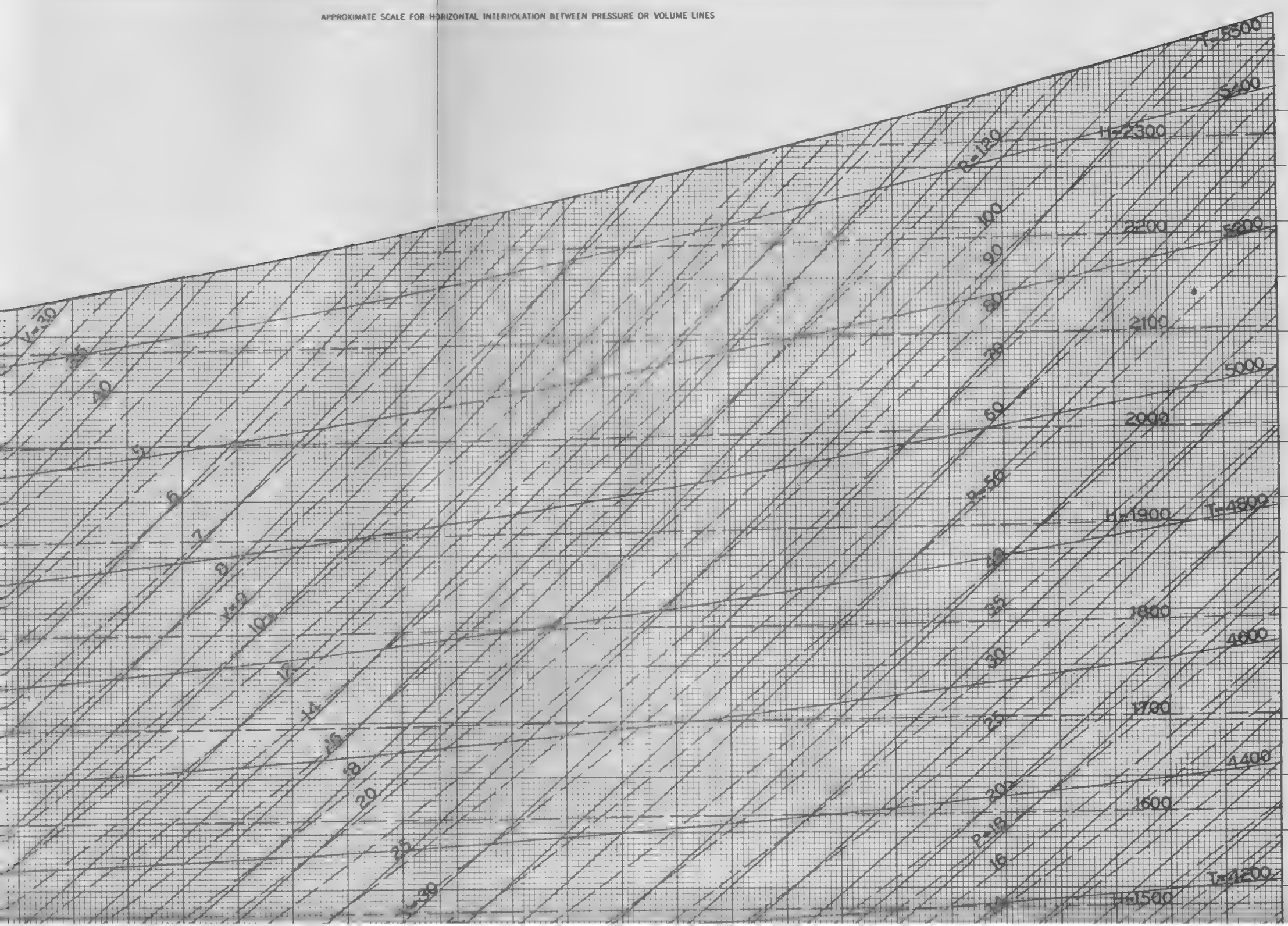
T = TEMPERATURE, °R = (°F + 460)

FUEL = $(CH_2)_x$

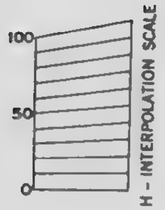


APPROXIMATE SCALE FOR HORIZONTAL INTERPOLATION BETWEEN PRESSURE OR VOLUME L

APPROXIMATE SCALE FOR HORIZONTAL INTERPOLATION BETWEEN PRESSURE OR VOLUME LINES

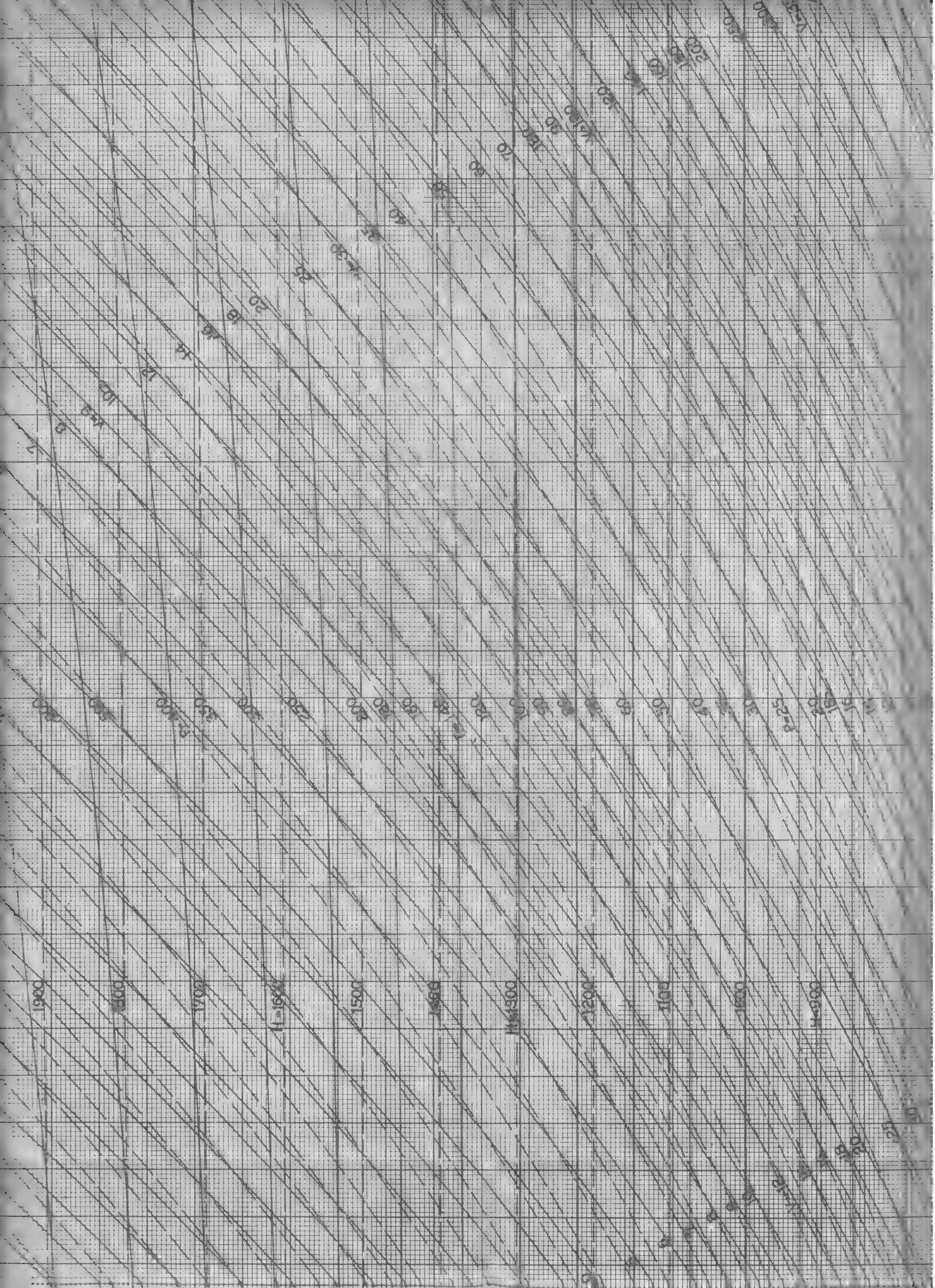


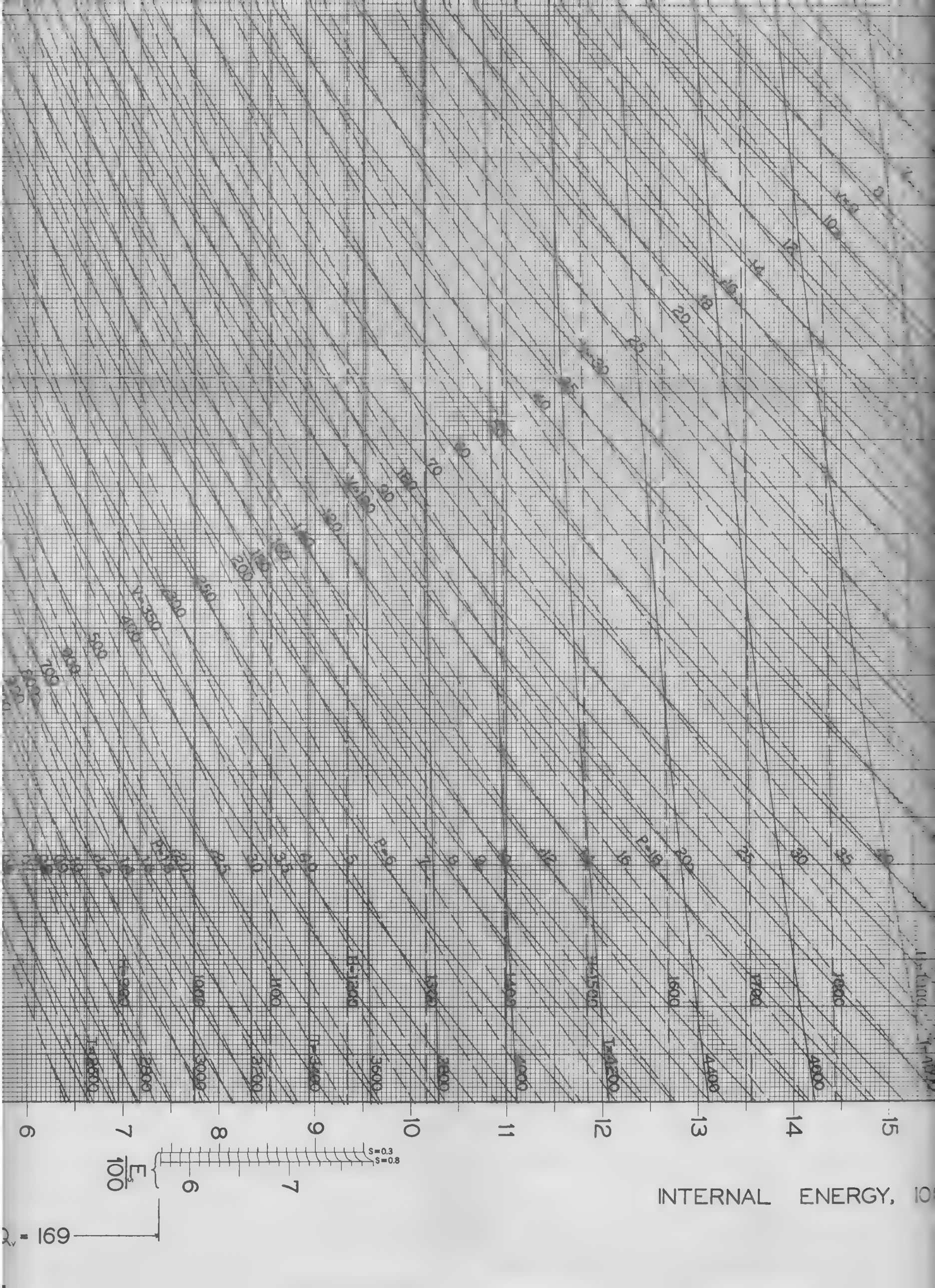
INTERNAL ENERGY, 100'S B.T.U.

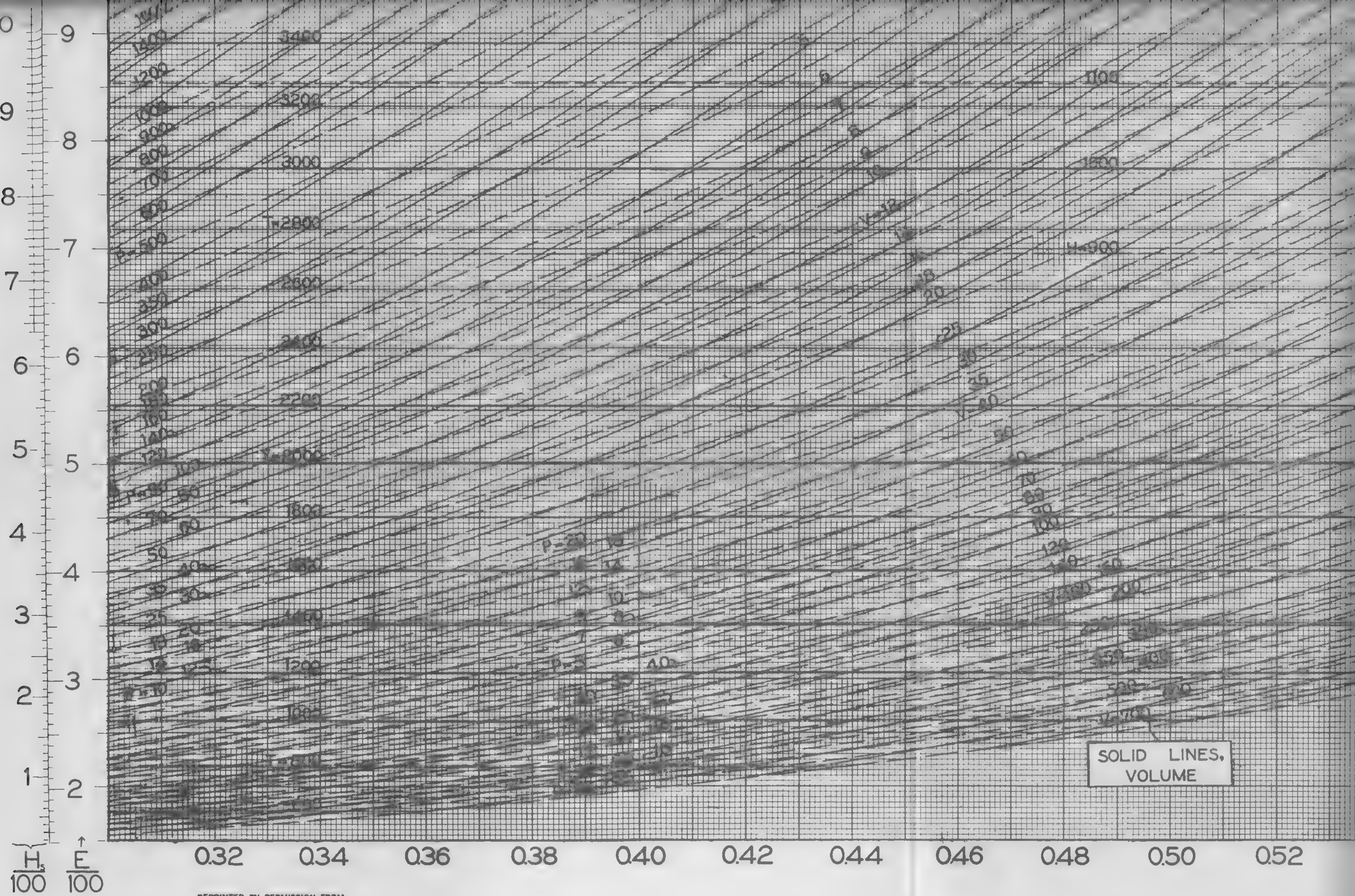


$\frac{H_s}{100}$

S=0.3
S=0.8




INTERNAL ENERGY, 10
S=0.3
S=0.8
E/100
Q_v = 169



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SOLID LINES,
VOLUME

DASHED LINES,
PRESSURE

ALL VALUES OF EXTENSIVE VARIABLES
THIS CHART ARE ON A MASS BASIS AND THU
REFERRED TO IN THE TEXT BY LOWER-CASE

0.42 0.44 0.46 0.48 0.50 0.52 0.54 0.56 0.58 0.60 0.62 0.64 0.66 0.68

ENTROPY, B. T. U. PER DEGREE R.

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

F = 1.1

PRODUCTS OF COMBUSTION OF 1 LB. OF AIR WITH 110% OF THEORETICAL FUEL, IN CHEMICAL EQUILIBRIUM 0.07453 LBS. FUEL/LB. AIR

ALL VALUES OF EXTENSIVE VARIABLES TAKEN FROM THIS CHART ARE ON A MASS BASIS AND THEREFORE ARE REFERRED TO IN THE TEXT BY LOWER-CASE SYMBOLS.

$\frac{E_s}{100}$

$E - E_s = Q_v = 169$ IN THIS RANGE

$\frac{E}{100}$

0.58 0.60 0.62 0.64 0.66 0.68 0.70 0.72 0.74 0.76 0.78

DEGREE R.

M. I. T., CAMBRIDGE, MASS.

E = INTERNAL ENERGY, B. T. U., ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR – N_2 AT 100°F

Q_v = INT. ENERGY OF COMBUSTION, AT 100°F., OF UNBURNED FUEL IN THE EQUILIBRIUM MIXTURE AT T. WHEN $T \leq 2880°R.$, $Q_v = 336$.

$E_s = E - Q_v$

H = ENTHALPY, $E + J(PV)$

$H_s = E_s + J(PV)$ $[\therefore H = H_s + Q_v]$

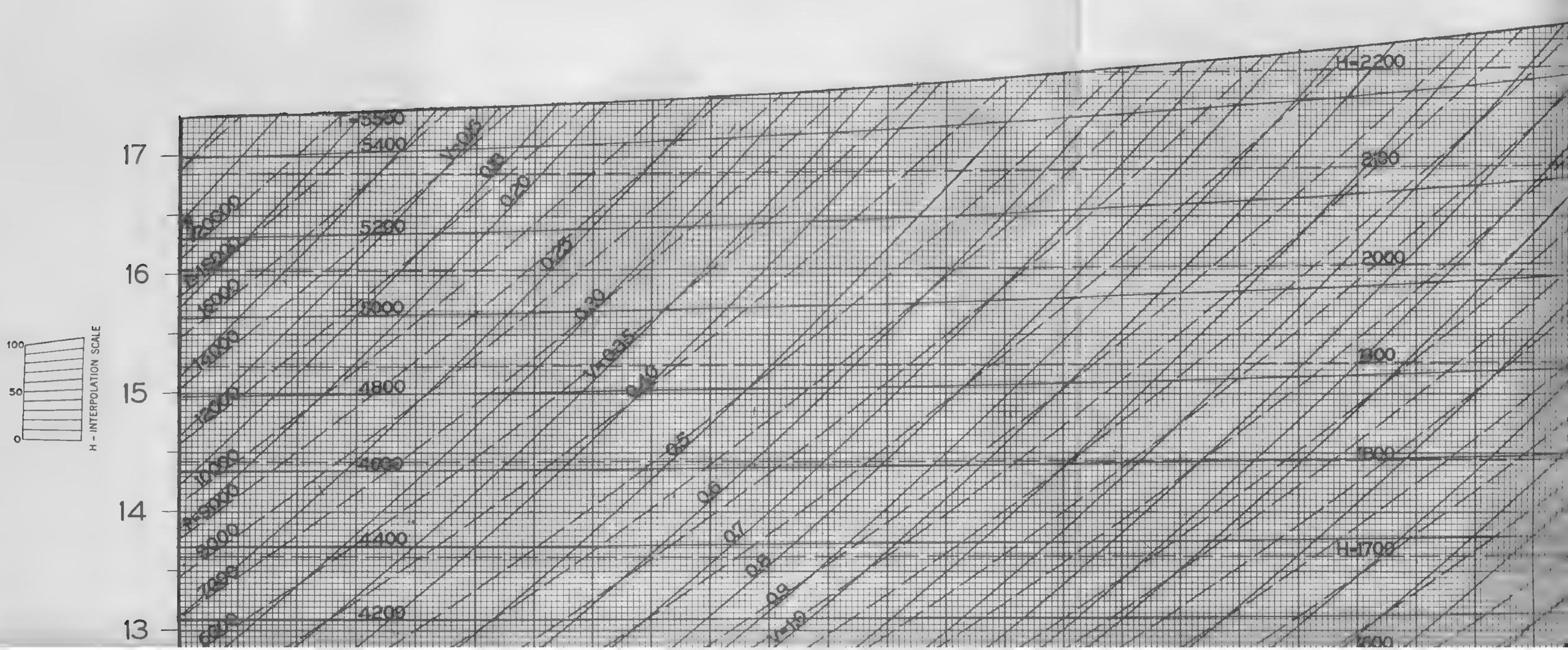
P = PRESSURE, LBS./SQ. IN. (DASHED LINES)

V = VOLUME, CU. FT. (SOLID LINES)

S = ENTROPY, ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR – N_2, EACH AT ONE ATMOSPHERE, 100°F

T = TEMPERATURE, °R = (°F + 460)

FUEL = $(CH_2)_x$



PRESSURE, LBS./SQ. IN. (DASHED LINES)

VOLUME, CU. FT. (SOLID LINES)

ENTROPY, ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR-N_2, EACH AT ONE ATMOSPHERE, 100°F

TEMPERATURE, °R = (°F + 460)

$\_ = (CH_2)_x$



APPROXIMATE SCALE FOR HORIZONTAL INTERPOLATION BETWEEN PRESSURE OR VOLUME LINES

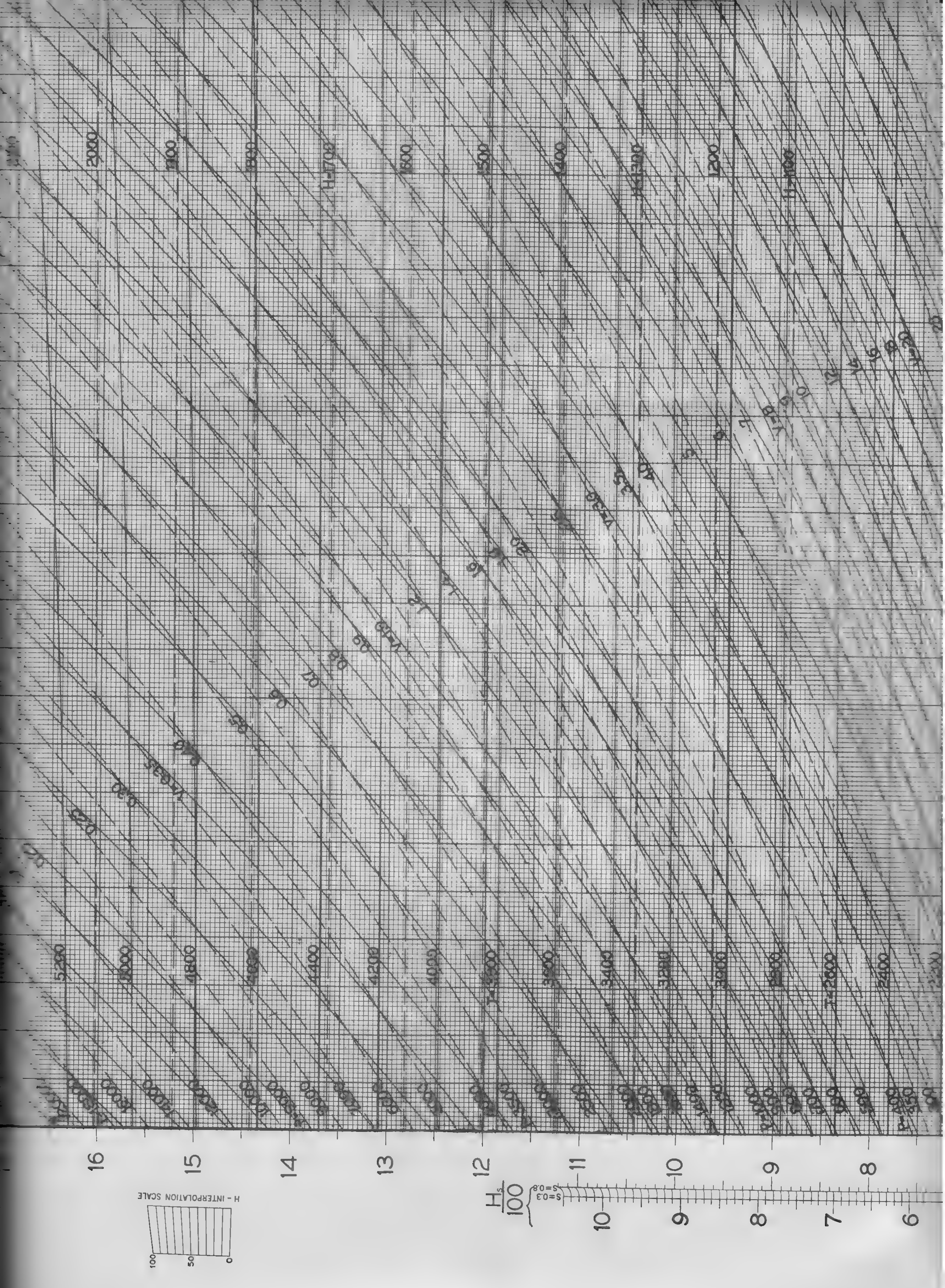


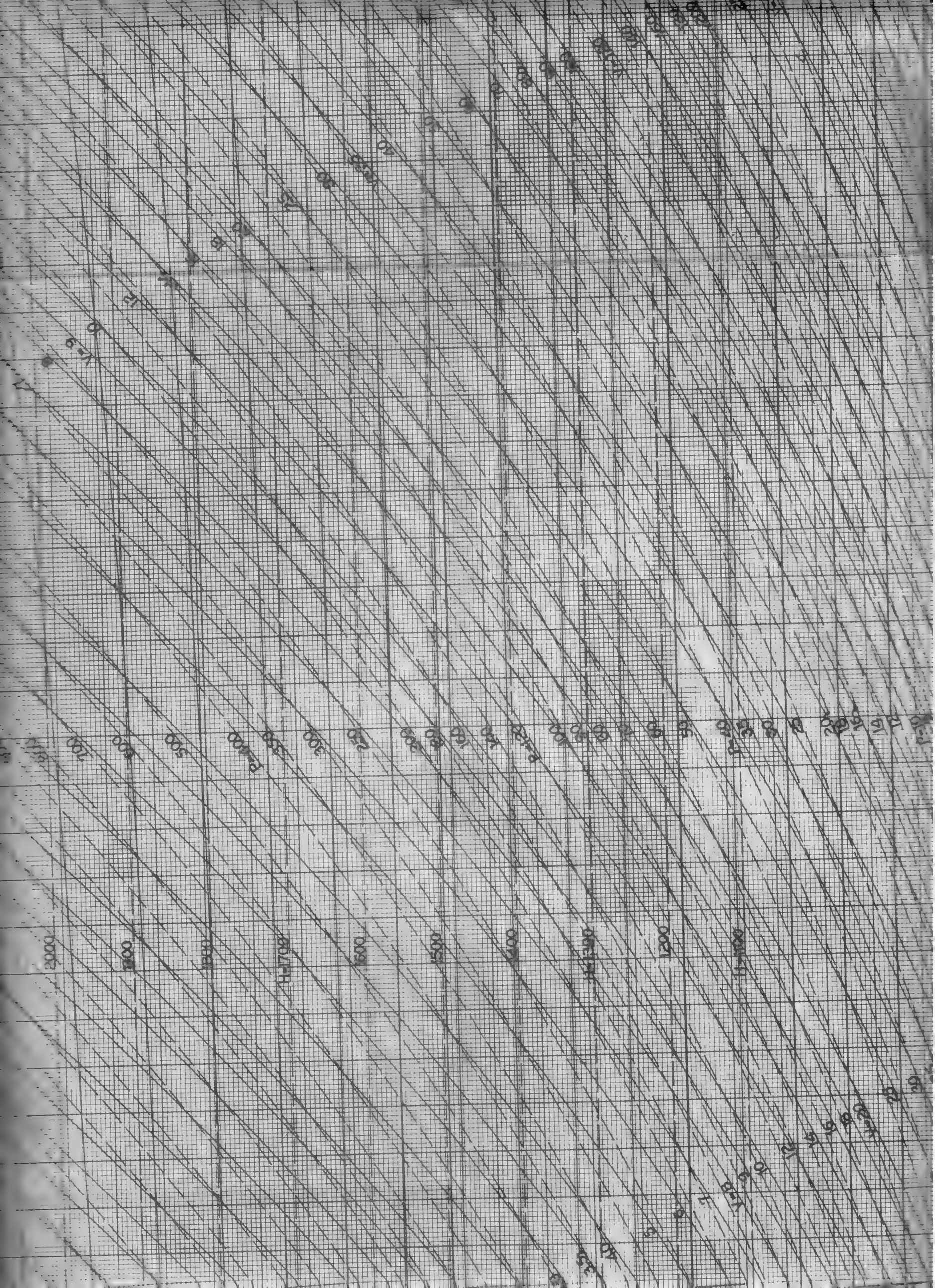


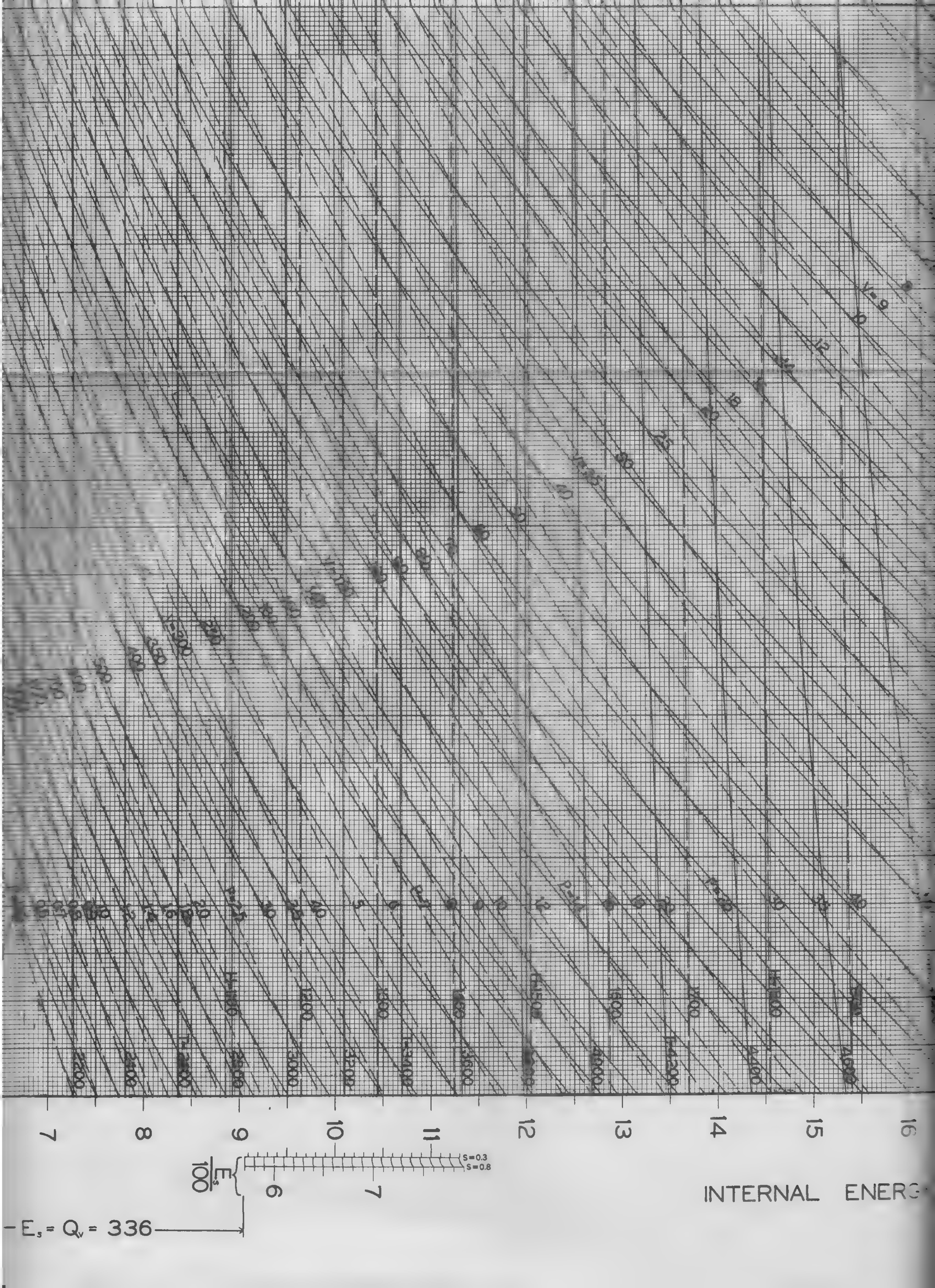
APPROXIMATE SCALE FOR HORIZONTAL INTERPOLATION BETWEEN PRESSURE OR VOLUME LINES

INTERNAL ENERGY, 100'S B. T. U.

20
19
18
17
16
15
14
13


H - INTERPOLATION SCALE
100
50
0
$\frac{H_s}{100}$
S=0.3
S=0.8
16
15
14
13
12
11
10
9
8
7
6




INTERNAL ENERG
7
8
9
10
11
12
13
14
15
16
S=0.3
S=0.8
$E_s = Q_v = 336$

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

$\frac{H_s}{100}$ $\frac{E}{100}$

0.32 0.34 0.36 0.38 0.40 0.42 0.44 0.46 0.48 0.50 0.52

ENTROPY, E

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SOLID LINES,
VOLUME

DASHED LINES,
PRESSURE

ALL VALUES OF EXTENSIVE VARIABLES TAKEN
THIS CHART ARE ON A MASS BASIS AND THEREFO
REFERRED TO IN THE TEXT BY LOWER-CASE SYM

D LINES,
SSURE

2 0.44 0.46 0.48 0.50 0.52 0.54 0.56 0.58 0.60 0.62 0.64 0.66 0.68

ENTROPY, B.T.U. PER DEGREE R.

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

F = 1.2

PRODUCTS OF COMBUSTION OF 1 LB. OF AIR WITH 120% OF THEORETICAL FUEL, IN CHEMICAL EQUILIBRIUM 0.08130 LBS. FUEL/LB. AIR

ALL VALUES OF EXTENSIVE VARIABLES TAKEN FROM THIS CHART ARE ON A MASS BASIS AND THEREFORE ARE REFERRED TO IN THE TEXT BY LOWER-CASE SYMBOLS.

$\frac{E_s}{100}$

$E - E_s = Q_v = 336$ IN THIS RANGE

$\frac{E}{100}$

0.58 0.60 0.62 0.64 0.66 0.68 0.70 0.72 0.74 0.76 0.78

DEGREE R.

M. I. T., CAMBRIDGE, MASS.

E = INTERNAL ENERGY, B. T. U., ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR – N_2 AT 100°F

Q_v = INT. ENERGY OF COMBUSTION, AT 100°F., OF UNBURNED FUEL IN THE EQUILIBRIUM MIXTURE AT T. WHEN $T \leq 2880°R.$, $Q_v = 336$.

$E_s = E - Q_v$

H = ENTHALPY, $E + J(PV)$

$H_s = E_s + J(PV)$ $[\therefore H = H_s + Q_v]$

P = PRESSURE, LBS./SQ. IN. (DASHED LINES)

V = VOLUME, CU. FT. (SOLID LINES)

S = ENTROPY, ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR – N_2, EACH AT ONE ATMOSPHERE, 100°F

T = TEMPERATURE, °R = (°F + 460)

FUEL = $(CH_2)_x$



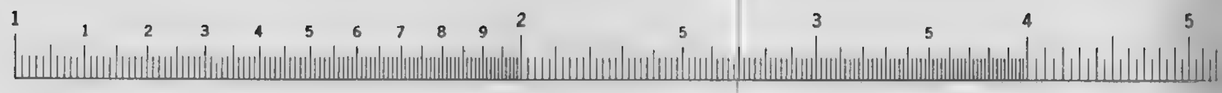
= PRESSURE, LBS./SQ. IN. (DASHED LINES)

= VOLUME, CU. FT. (SOLID LINES)

= ENTROPY, ABOVE CO_2, H_2O (VAPOR), O_2, AND AIR-N_2, EACH AT ONE ATMOSPHERE, 100°F

= TEMPERATURE, °R = (°F + 460)

UEL = $(CH_2)_x$



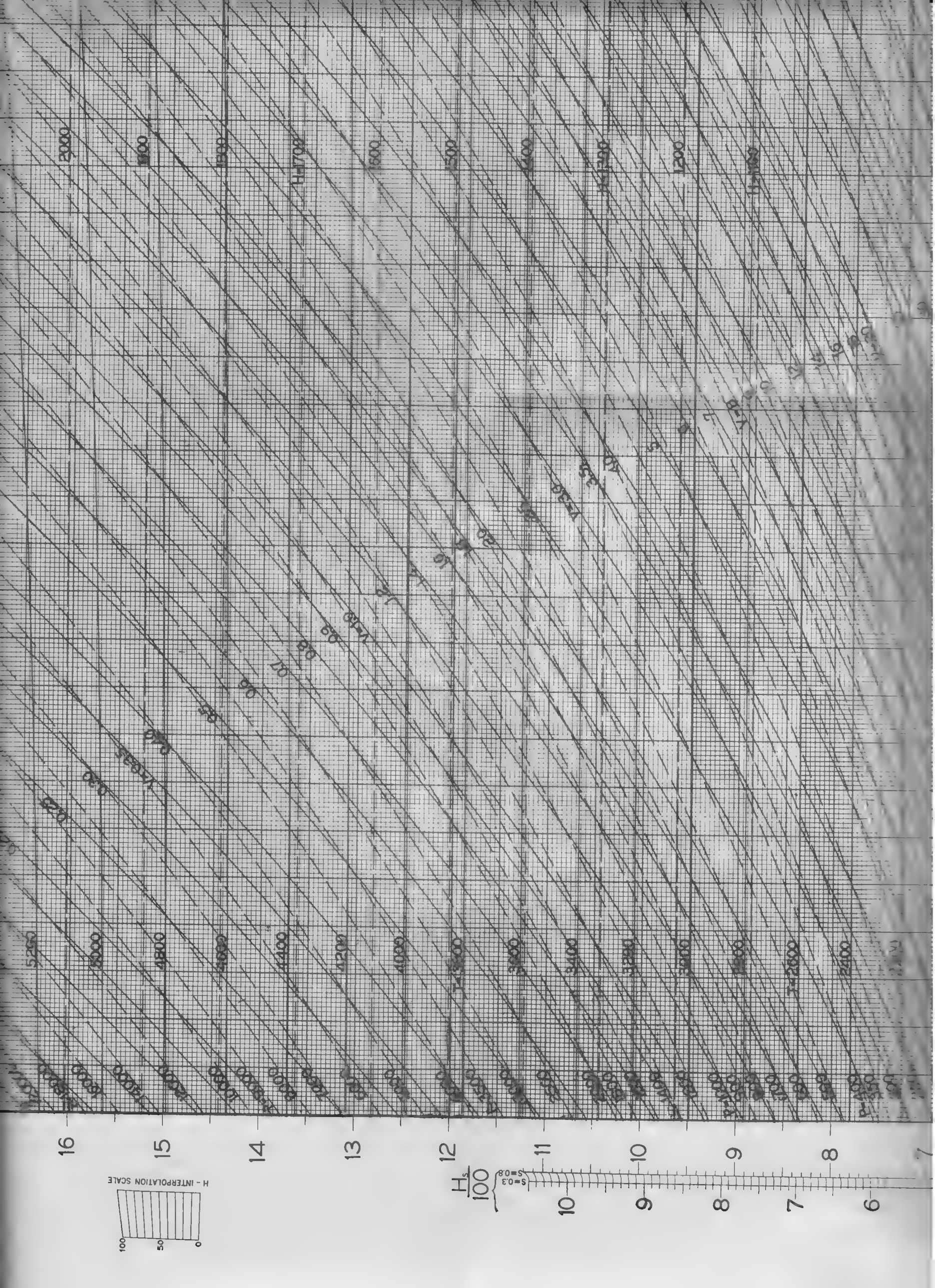
APPROXIMATE SCALE FOR HORIZONTAL INTERPOLATION BETWEEN PRESSURE OR VOLUME LINES

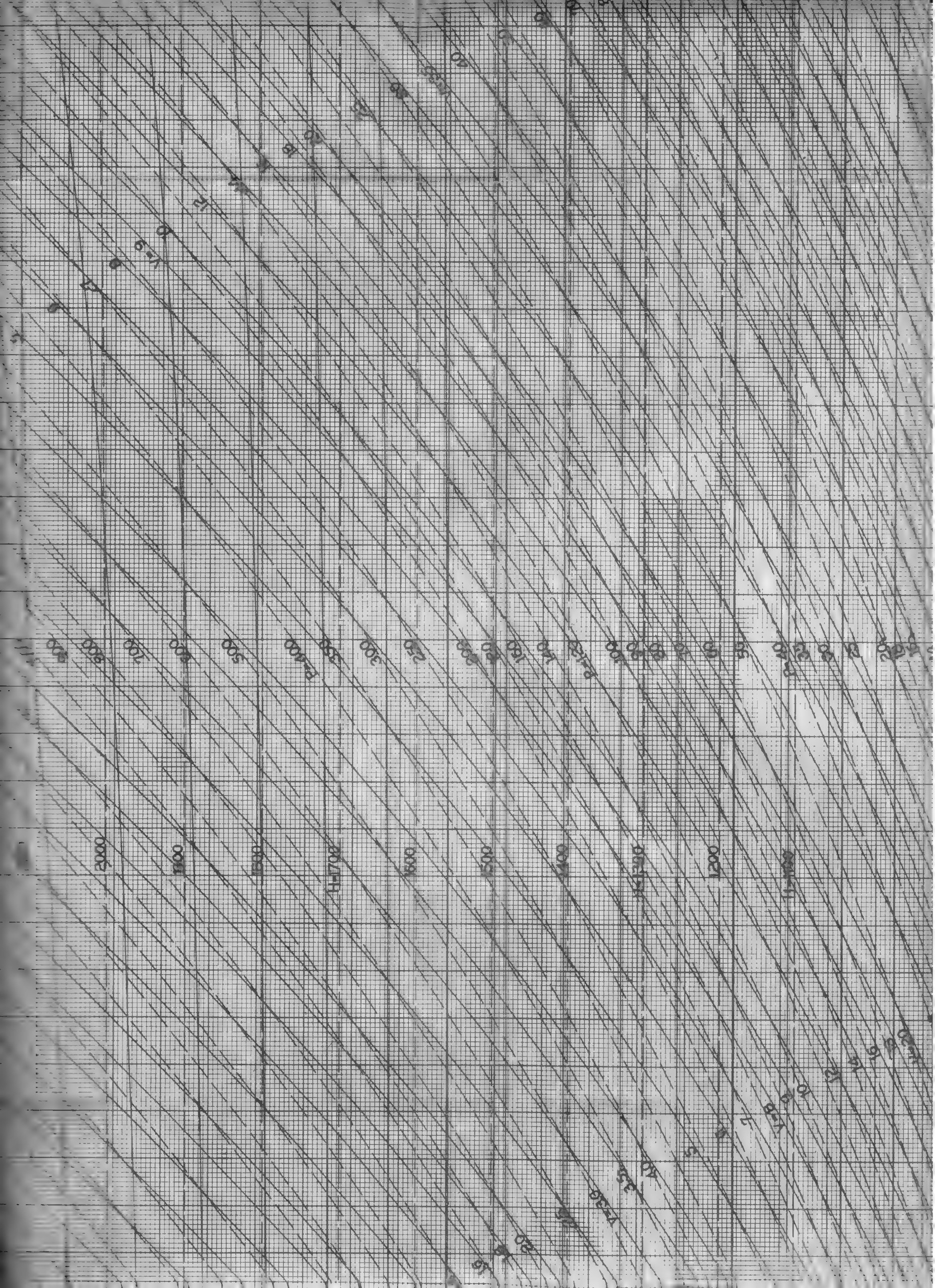


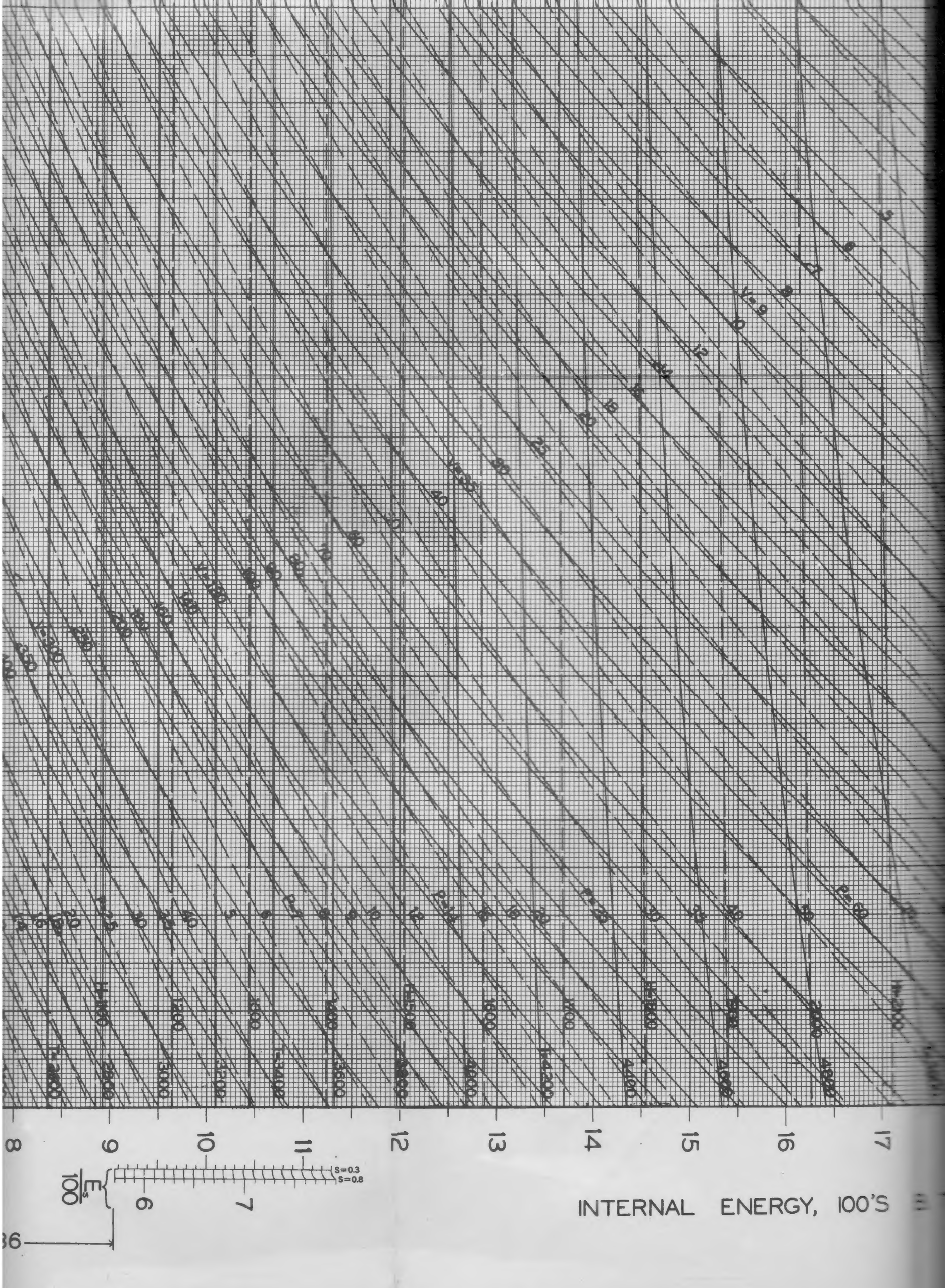
APPROXIMATE SCALE FOR HORIZONTAL INTERPOLATION BETWEEN PRESSURE OR VOLUME LINES

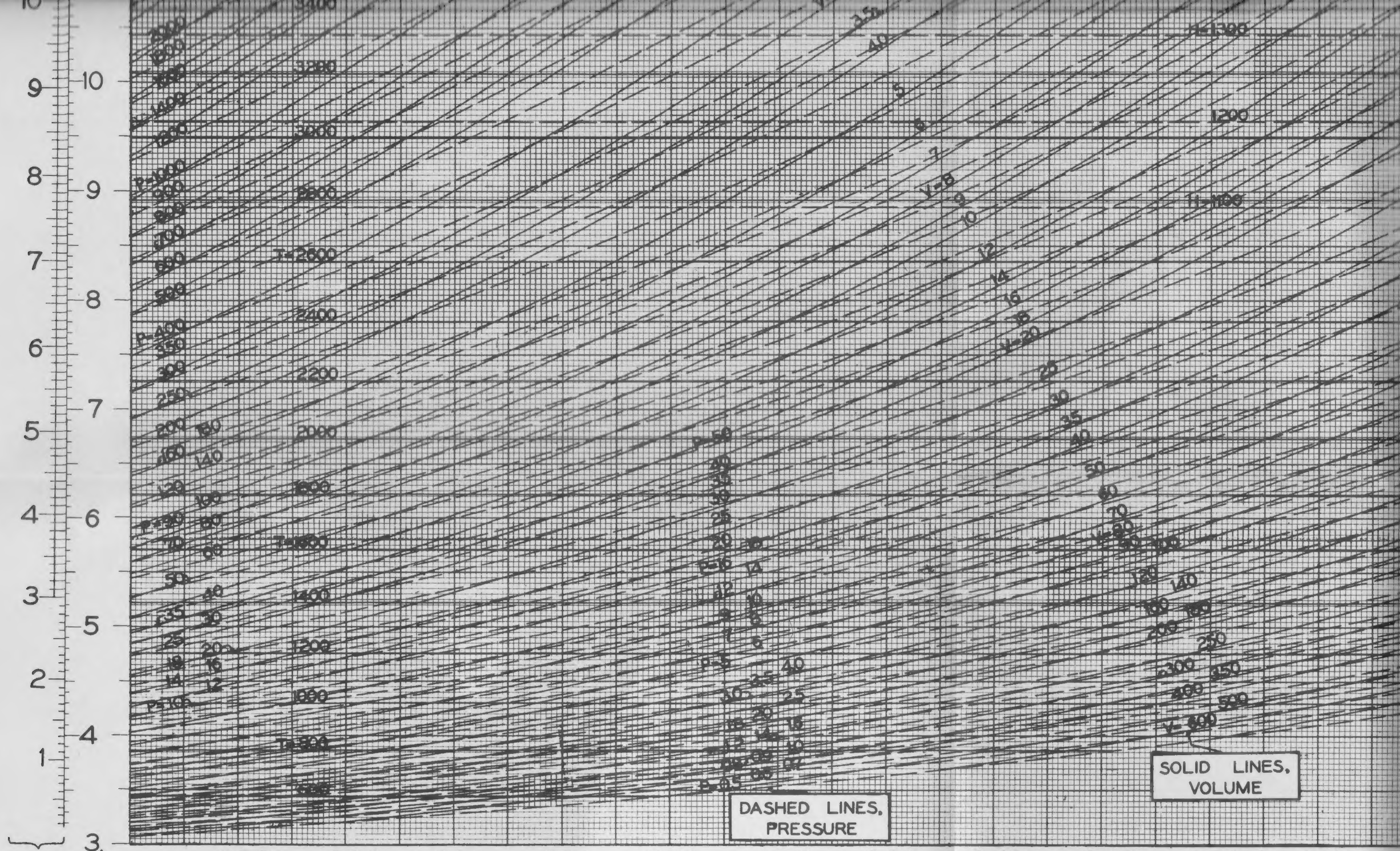
INTERNAL ENERGY, 100'S B. T. U.

20
19
18
17
16
15
14
13

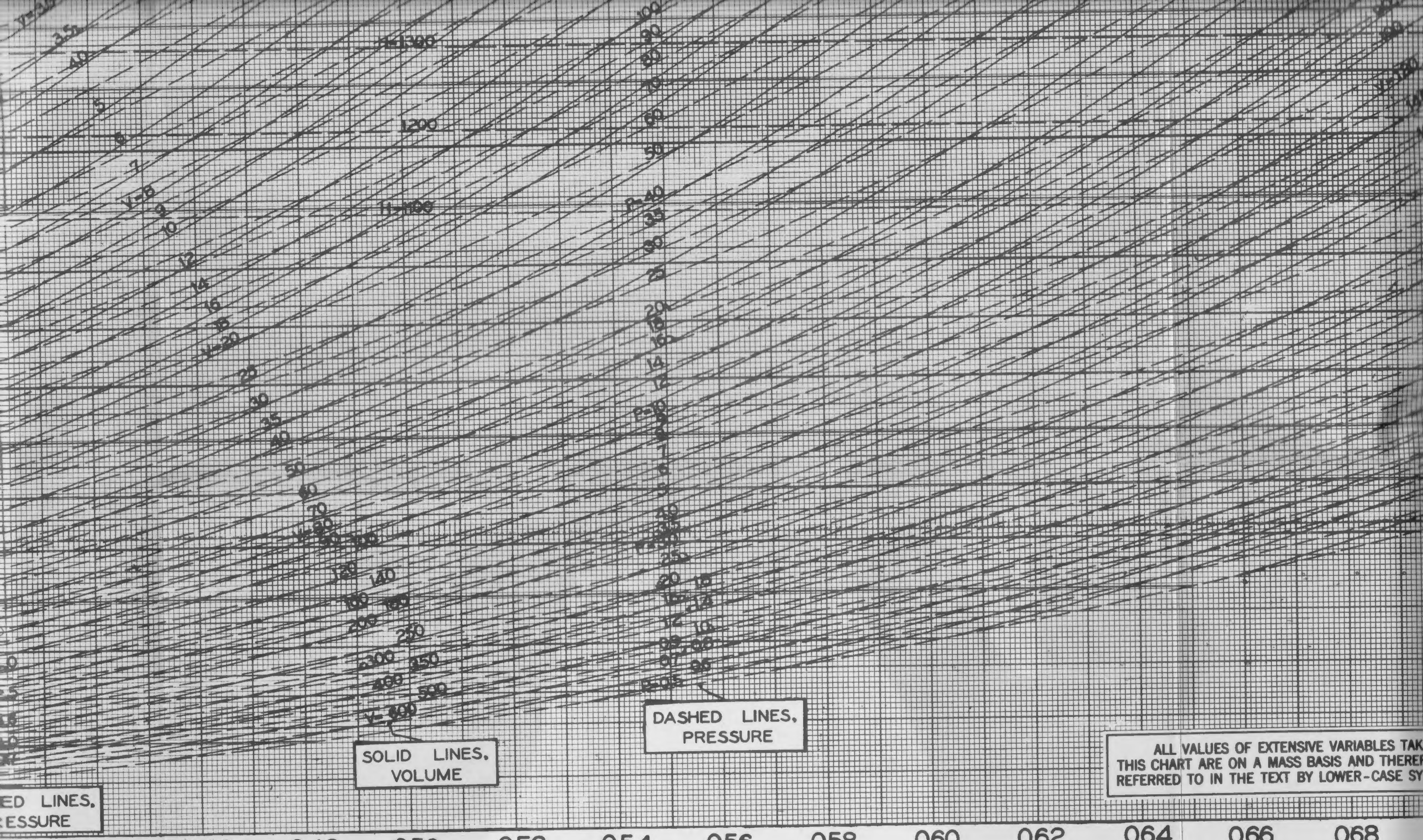

H - INTERPOLATION SCALE
100
50
0
$\frac{H_s}{100}$
S=0.3
S=0.8
16
15
14
13
12
11
10
9
8
7
6




INTERNAL ENERGY, 100'S
S=0.3
S=0.8



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SOLID LINES, VOLUME
DASHED LINES, PRESSURE
ALL VALUES OF EXTENSIVE VARIABLES TAK
THIS CHART ARE ON A MASS BASIS AND THERE
REFERRED TO IN THE TEXT BY LOWER-CASE SY
0.42
0.44
0.46
0.48
0.50
0.52
0.54
0.56
0.58
0.60
0.62
0.64
0.66
0.68
ENTROPY, B.T.U. PER DEGREE R.

DASHED LINES, PRESSURE

SOLID LINES, VOLUME

F = 1.2

PRODUCTS OF COMBUSTION OF 1 LB. OF AIR WITH 120% OF THEORETICAL FUEL, IN CHEMICAL EQUILIBRIUM 0.08130 LBS. FUEL/LB. AIR

ALL VALUES OF EXTENSIVE VARIABLES TAKEN FROM THIS CHART ARE ON A MASS BASIS AND THEREFORE ARE REFERRED TO IN THE TEXT BY LOWER-CASE SYMBOLS.

$E - E_s = Q_v = 336$ IN THIS RANGE

$\frac{E_s}{100}$

$\frac{E}{100}$

0.58 0.60 0.62 0.64 0.66 0.68 0.70 0.72 0.74 0.76 0.78

3 4 5 6 7 8 9 10

DEGREE R.

M. I. T., CAMBRIDGE, MASS.